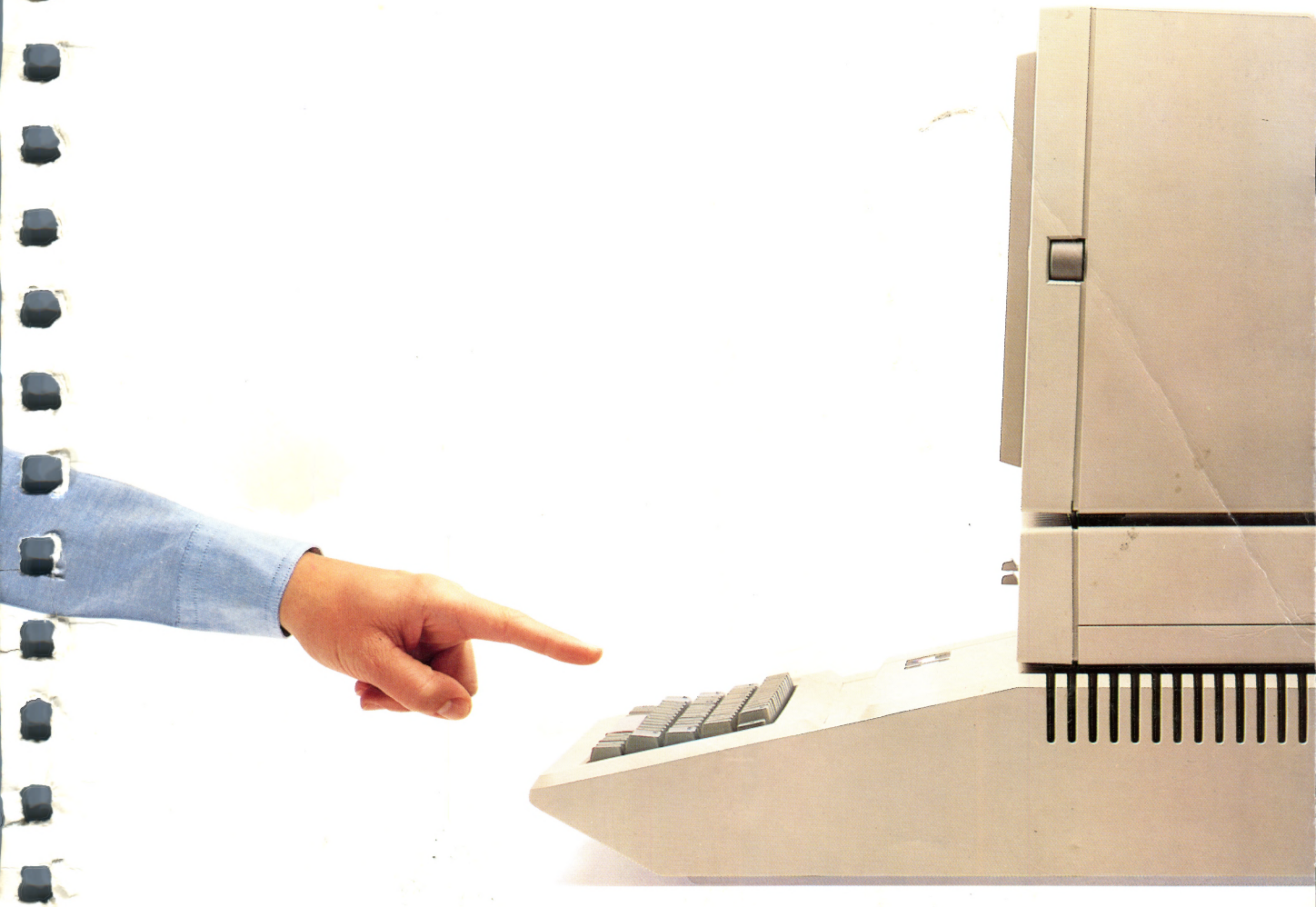
Apple® IIe Owner's Manual



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This revision of the *Apple IIe Owner's Manual* is dedicated to those Apple owners who used the Tell Apple Cards in the back of their manuals to send us their ideas and suggestions. In the Apple tradition, we listened to you, and learned from you. Thanks for your help in improving our products. Keep those cards coming!

Apple® IIe Owner's Manual

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Radio and Television Interference

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly—that is, in strict accordance with our instructions—it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation, especially if a "rabbit ear" television antenna is used. (A "rabbit ear" antenna is the telescoping-rod type usually contained on television receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripherals. To further isolate the problem, disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it was caused by either the peripheral device or the I/O cable. These devices usually require shielded I/O cables. For Apple peripherals, you can obtain the proper **shielded cable** from your dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

Shielded cable: A cable that uses a metallic wrap aroung the wires to reduce the potential effects of radio frequency interference.

If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.

- Plug the computer into an outlet that is on a different circuit than the television or radio. (That is, make certain the computer and the radio or television set are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with a coaxial cable lead-in between the antenna and televison.

If necessary, you should consult your Apple-authorized dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the Federal Communications Commission:

How to Identify and Resolve Radio-TV Interference Problems.

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock Number 004-000-00398-5.

Preface

Welcome to Apple

This book is an introduction to computers in general and to the Apple® IIe in particular. Our goal is to make you comfortable with the Apple IIe so you'll be able to get the most out of it—whether that means mastering a word processing program, enhancing your education, writing your own programs, or simply getting higher scores at Zork™.

Because people use computers for so many things, it's impossible to cover in this owner's manual every computer application and teach every programming language. Instead, this book will give you the tools, the terminology, and the hands-on experience to tackle the next step—learning to use an application program, learning to write programs, or both.

Hands-On Experience

You'll get your first hands-on experience by using the training disk that came packed with this owner's manual. One side of the training disk gives you practice using the keyboard and introduces some concepts and procedures common to hundreds of Apple IIe programs. The other side of the training disk demystifies computer memory and explains how information gets from your head into the memory of the computer and out to disks for safekeeping.

This owner's manual will tell you how and when to use the disk, and will summarize the information presented on the disk so you can refer to it easily while using other programs.

Who It's For

This book is designed primarily for newcomers to computers. If you're an experienced user, you might want to read the summaries at the end of each chapter instead of reading the book from front to back. If you've used other models of the Apple II family, be sure to read Appendix A, which describes differences between the machines that can affect the way programs work.

Not a Technical Reference Manual: If you're looking for memory addressing maps, firmware listings, timing charts, and the like, ask your Apple dealer for the *Apple IIe Reference Manual*.

How It Works

As you explore this manual, you'll occasionally see the symbols shown in Figure P-1.

Figure P-1. Disk/Book Symbols

Go to Disk

Return to Book

The first symbol means "go to the disk" for some hands-on exercises. The second symbol means "return to the book" for a recap of what you learned on the disk and for related information.

Look for these visual cues throughout the manual:

By the Way: Text set off in this manner presents sidelights or interesting pieces of information.

Important! Text set off in this manner—and with a tag in the margin—presents important information.

Warning Warnings like this indicate potential problems or disasters.

Brief definitions and cross-references appear in marginal glosses like this one.

Computer words and phrases appear in boldface type when they are introduced. Sometimes additional information about the term may appear in the margin; the term is always defined in the glossary.

You will also see a special typeface used for what you type:

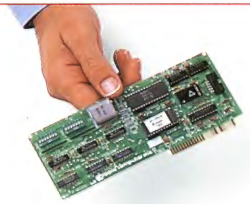
```
It looks like this.
```

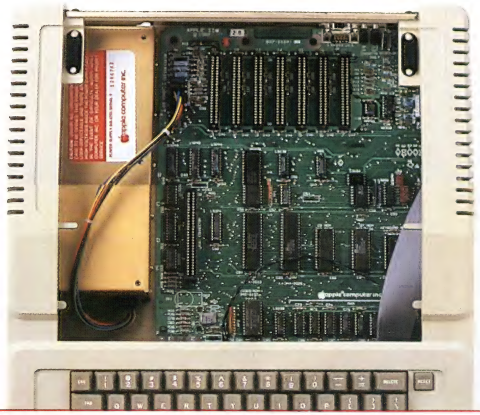
Keys look like this: ←, ⌘, RETURN. When you see a hyphen joining two or more keys, it means you press them simultaneously. For instance, ⌘-CONTROL-RESET means all three keys should be pressed at the same time.

OK, that's how the book works. Now you're ready to learn how the computer works.

Chapter 1

Meet Your Apple IIe





Two words that get thrown around a lot in conversations about computers are **hardware** and **software**.

Hardware refers to the **computer**, the **disk drive**, the **monitor**, and any other piece of equipment you can see, touch, and connect to your computer. (See Figure 1-1.) The individual hardware components that you attach to your computer are called **peripheral devices** (because they are peripheral to the computer itself). *Peripheral device* is a mouthful, so the expression is usually shortened to **device** or **peripheral**.

Figure 1-1. Hardware

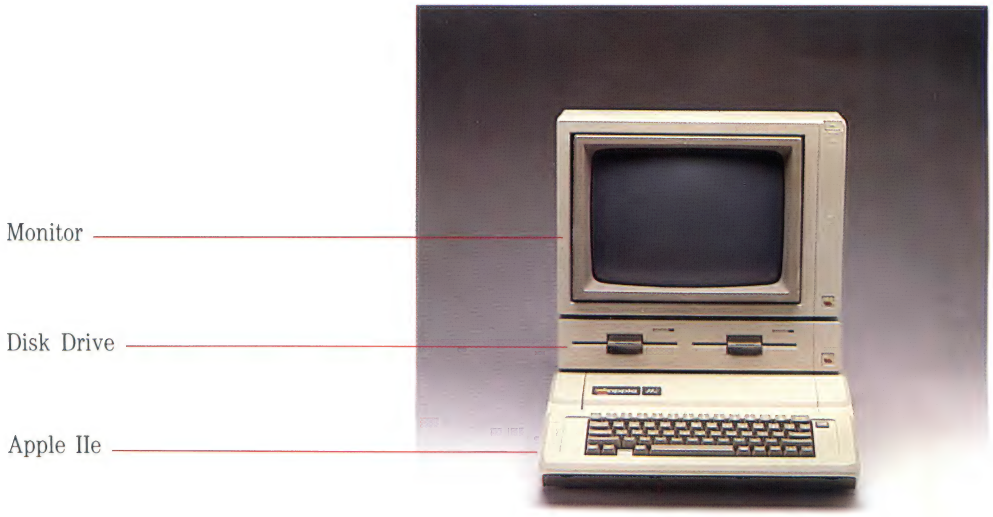


Figure 1-2. Software

Software refers to the instructions, called **programs**, that tell the computer what to do. You can learn to write programs yourself, or you can buy programs ready-made on every subject from planning investments to keeping track of students' grades.

Programs are recorded on **disks**. (See Figure 1-2.) That's why a disk drive is an indispensible part of your **computer system**—it **loads** programs from disks into the computer, and it stores information on disks so you can retrieve it later.

In a few minutes you're going to use a program called *Apple Presents the Apple IIe: An Introduction* to learn about the computer, but first you've got to get your computer system set up.

Already Set Up? If you've already got your monitor and disk drive connected to your Apple IIe, you can skip directly to Chapter 2.

Setting Up Your Computer System

If you haven't done so already, unpack your computer and make sure you've got everything shown in Figure 1-3. If you're missing anything, contact your Apple dealer. If everything's in order, fill out your warranty card and mail it in. The card registers you as an Apple owner so you can be notified of important changes to Apple products.

Figure 1-3. Take Inventory

Plugging In the Power Cord

Before you even think about plugging anything into your Apple IIe, make sure the computer **power switch** is turned off. The power switch is in the right corner as you face the back of the machine.

Plug the power cable into the Apple IIe as shown in Figure 1-4. Eventually you'll be plugging the other end of the power cord into a three-hole, grounded outlet, but as a safety precaution, leave it unplugged until you finish connecting peripheral devices to your Apple IIe.

▲ Warning

Do not plug in your Apple IIe power cord until you've read the important safety instructions later in this chapter.

Important!

Your Apple IIe and its peripheral devices were FCC-certified under test conditions that include use of **shielded cables** and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radio, television, and other electronic devices.

Shielded cable: A cable that uses a metallic wrap around the wires to reduce the potential effects of radio frequency interference.

Figure 1-4. Plug in Power Cable

Connecting a Monitor

Plug one end of the monitor cable into the back of the monitor as shown in Figure 1-5. Plug the other end of the monitor cable into the Apple IIe's monitor outlet on the far left as you face the back of your computer. You can tell it's a monitor outlet because it's got a monitor symbol right above it. (See Figure 1-6.)

Figure 1-5. Plug Monitor Cable Into Monitor

Figure 1-6. Plug Monitor Cable Into Computer

Plug the monitor power cable into a three-hole, grounded outlet.

Eventually you'll want to set your monitor on top of your Apple IIe, but for now, leave it on the desk beside your computer so you'll be able to remove the Apple IIe cover to install other devices.

Using a Television Set as a Monitor: If you plan to use a television set as a monitor, you'll need a **radio frequency (RF) modulator**. An RF modulator, available from your Apple dealer, modifies signals from the computer so your TV can tune them in. RF modulators come with instructions that explain how to install them.

Inside Connections

As you may have noticed, there is no disk drive symbol on the back of the Apple IIe. That's because disk drives, and lots of other peripheral devices, come with special **interface cards** designed to plug into slots inside the computer case. Before you can connect your disk drive, you'll need to pop the top of your Apple IIe.

Cards: The disk drive's interface card is called a **controller card**. You may also hear the term **peripheral card**, or just plain **card**.

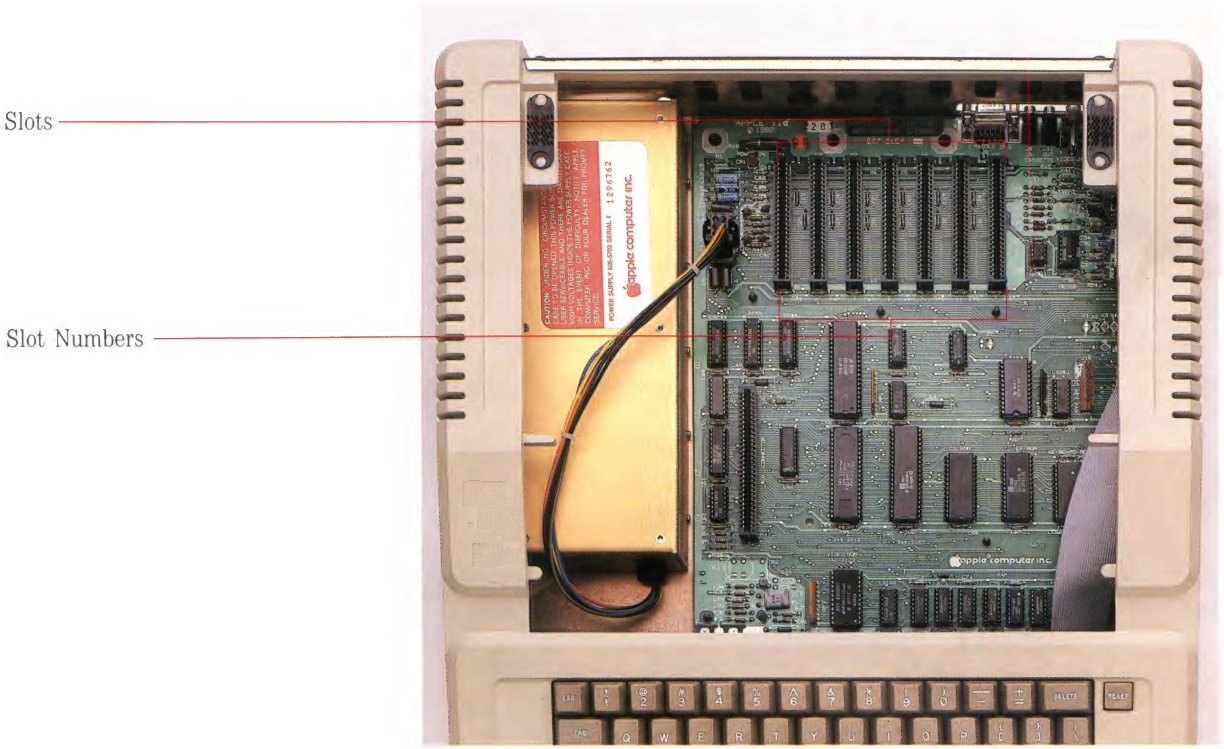
Popping the Top

Wrap your fingers under the tabs that project from the back of the computer cover and pull up firmly until the fasteners pop. Slide the cover back, away from the **keyboard**, then lift it off and set it aside. (See Figure 1-7.)

Try not to be dazzled by all the **chips** and **resistors** inside the case while you direct your attention to the row of **slots** along the rear of the **main circuit board**. (See Figure 1-8.) The main circuit board is the sheet of green plastic that lines the bottom of the computer case. The slots are numbered from 1 to 7 (from left to right). You'll be putting the disk drive controller card in slot 6.

Figure 1-7. Popping the Apple IIe Top

Figure 1-8. Slots



▲Warning Make sure the tiny bulb labeled *POWER ON* to the left of slot 1 is off. If it is lit up, turn off the computer's power switch and unplug the Apple IIe power cord before you do anything else.

Connecting a Disk Drive

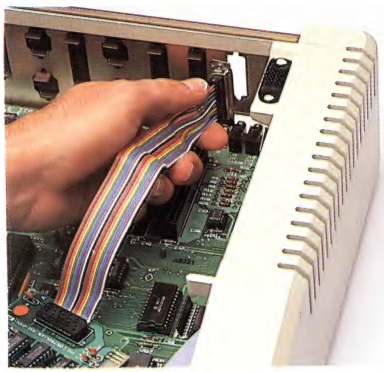
This section shows you how to connect an Apple DuoDisk™ drive to your Apple IIe.

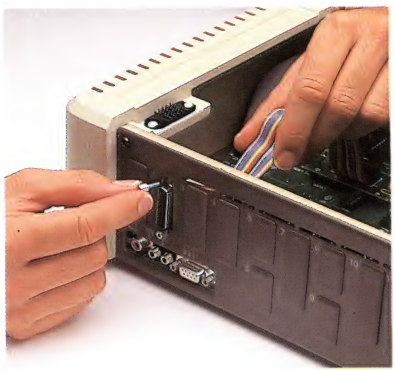
Other Disk Drives: If you have a different type of disk drive, install it according to the instructions that came with it.

1. Remove the plastic insert that covers opening 2 on the **back panel** of the computer by reaching inside the computer case and pushing down and out on the tab that projects from the plastic insert. See Figure 1-9.
2. Hold the D-shaped connector (on the end of the cable extending from the disk drive controller card) up to the inside opening in the back panel. Anchor the connector to the back panel using the two screws and the wrench that came with the disk drive. See Figure 1-10.

Figure 1-9. Remove Insert From Back Panel

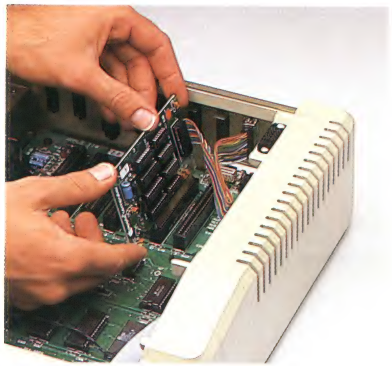
Figure 1-10. Anchor Cable to Back Panel





3. Hold the disk drive controller card over slot 6 so that the bare side of the card is facing the **power supply** (the big metal box on the left). Gently but firmly push the gold "fingers" on the card's edge into slot 6, rear edge first as shown in Figure 1-11. Then push the front edge down and gently rock the card from back to front until it is level and firmly seated. Don't touch the gold fingers when you handle the card. (Oil from your fingers could weaken the connection between the card and the computer.)

Figure 1-11. Put Card in Slot 6



4. Connect one end of the disk drive cable to the connector now visible through the opening in the back panel of the computer. Make sure the D-shapes are lined up the same way on both connectors. See Figure 1-12. Then tighten the retaining screws with a small standard screwdriver.
5. Connect the other end of the disk drive cable to the outlet on the back of the disk drive. See Figure 1-13. Then tighten the retaining screws.

Figure 1-12. Connect Disk Drive Cable to Card Cable

Figure 1-13. Connect Disk Drive Cable to Disk Drive

6. Attach the **drive 1** label that came with your DuoDisk to the recess on the left. Attach the drive 2 label to the recess on the right.

Connecting an Auxiliary Memory Card

In addition to the seven slots along the rear of the main circuit board, there is a special slot on the left side of the circuit board labeled **AUX. CONNECTOR**, short for **auxiliary connector**. That slot is reserved for cards that increase the Apple IIe's **memory** and video capabilities—like the **80-Column Text Card**, the **Extended 80-Column Text Card**, the **Extended 80-Column Text/AppleColor Adaptor Card**, and other auxiliary memory cards.

An 80-Column Text Card makes it possible for the Apple IIe to display 80 characters per line instead of the standard 40 characters per line. An Extended 80-Column Text Card gives you the 80-character-per-line display plus additional memory. (You'll learn all about memory in Chapter 4, but essentially, having more memory makes it possible for you to use more sophisticated programs on your Apple IIe.) An Extended 80-Column Text/AppleColor Adaptor Card gives you the 80 characters per line, the extra memory, and allows you to connect an RGB color monitor to your Apple IIe. (You'll learn about RGB color monitors in Chapter 6.)

If you have one of these cards, install it in the AUX. CONNECTOR slot as shown in Figure 1-14.

- Be sure that the bare side of the card faces the power supply (the metal box to the left of the AUX. CONNECTOR slot).
- Gently push the gold "fingers" on the card's edge into the AUX. CONNECTOR slot, rear edge first. Then push the front edge down and gently rock the card from back to front until it is level and firmly seated. Don't touch the gold fingers when you handle the card.

Figure 1-14. Put 80-Column Card in AUX. CONNECTOR Slot

Figure 1-15. Replace the Apple IIe Cover

Replacing the Apple IIe Cover

When you finish connecting your disk drive (and 80-column card, if you have one), put the cover back on the computer. (See Figure 1-15.) When you've got the cover in place, press down firmly on the back corners until you hear the fasteners pop shut on both sides.

Important Safety Instructions

You're almost ready to plug in your Apple IIe and get started, but first read these important safety instructions.

▲ Warning

This equipment is intended to be electrically grounded. Your Apple IIe is equipped with a three-wire grounding plug—a plug having a third (grounding) pin. This plug will fit only a grounding-type AC outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet with a properly grounded outlet.

Do not defeat the purpose of the grounding plug!

For your own safety and the safety of your equipment, always take the following precautions:

Be sure the power plug is disconnected (disconnect by pulling the plug, not the cord)

- Whenever you remove the cover and as long as the cover is off;
- If the power cord or plug is frayed or otherwise damaged;
- If anything is spilled into the case;
- If your Apple IIe is exposed to rain or any other excess moisture;
- If it has been dropped or if the case has been otherwise damaged;
- If you suspect that your computer needs servicing or repair;
- Whenever you clean the case (use only the recommended procedure given below).

Be sure that you always do the following:

- Keep your Apple IIe away from sources of liquids, such as wash basins, bathtubs, shower stalls, and so on.
- Keep it protected from damp or wet weather, such as rain, snow, and so on.
- Read all the installation instructions carefully before you plug in your Apple IIe to a wall socket.
- Keep these instructions handy for reference by you and others.
- Follow all instructions and warnings dealing with the Apple IIe.

Warning Electrical equipment may be hazardous if misused. Operation of this product, or similar products, must always be supervised by an adult. Do not allow children access to the interior of any electrical product and do not permit them to handle any cables.

To clean the case, do the following:

1. Disconnect the power plug. (Pull the plug, not the cord.)
2. Use a water-damp, clean, soft cloth. Wipe the surfaces lightly, but *do not wipe the screen of the monitor*. For cleaning the monitor screen, use only the special cloth that came with it, and do not moisten it.

Plug In the Apple IIe Power Cord

Now that you've read the safety instructions, you can plug in the Apple IIe power cord, but don't turn on the power yet. You'll learn how to start up in the next chapter.

Runaway Disk Drive: At this point your computer power switch should still be off. If you jumped the gun and turned the Apple IIe power switch on without the right kind of disk in the disk drive, you've got a runaway disk drive on your hands. You can stop the whirring disk drive by holding down (CONTROL) while you press (RESET). When the whirring stops, turn off the power and follow the startup instructions in the next chapter. (You could have stopped the disk drive just by turning off the power, but for reasons you'll understand later, it's not a good habit to turn off the computer while the disk drive is in gear. If you stopped it that way this time, don't panic. It's only a problem when there's a disk in the disk drive.)

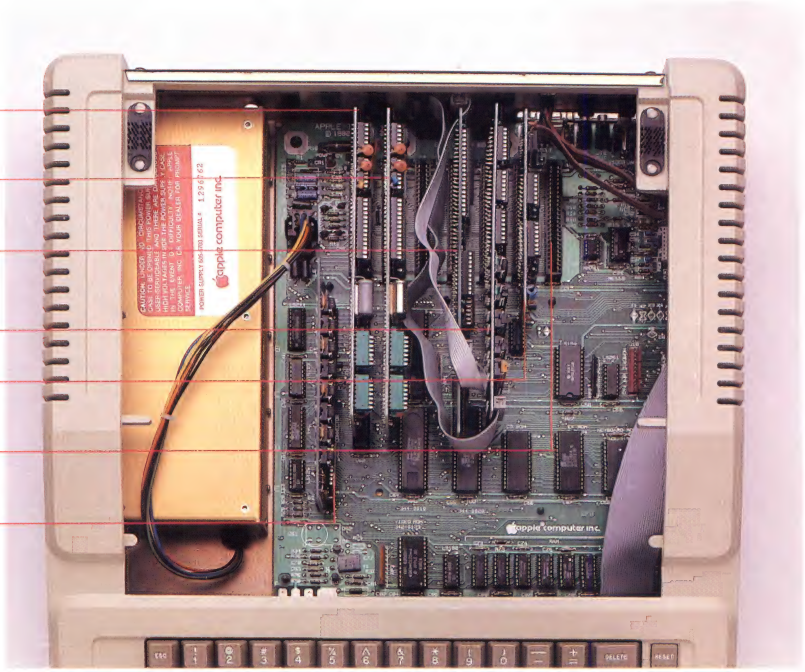
Connecting Other Peripheral Devices

Once you've stuck your first card in a slot, and learned how to anchor cable connectors to the back panel of the Apple IIe, installing other devices is a snap. Just follow the installation instructions that come with your **printer**, **mouse**, or other peripheral device, and keep these general installation rules in mind:

- Make sure the computer's power is off and that the power cord is unplugged before connecting any device to your Apple IIe.
- Make sure the bare side of the card faces the power supply (the big metal box on the left side of the circuit board).
- Install cards by rocking the card from back to front and not from side to side. Press down firmly, but don't force it. Don't touch the gold fingers on the bottom of the card.

- Put the card in the recommended slot. Unless the device's manual tells you otherwise, follow the guidelines in Figure 1-16.
- When you're joining cables, make sure the pins on one connector line up with the holes on the other connector. If you aren't careful, you could bend a pin or force a pin into the wrong opening and damage the connector, the peripheral, or even the computer.

Figure 1-16. Put Card in Recommended Slot


Super Serial Card (for Printer) in Slot 1
Super Serial Card (for Modem) in Slot 2
Mouse Card (or Co-processor Card) in Slot 4
ProFile Card in Slot 5
DuoDisk Drive Card in Slot 6
Co-processor Card or Clock Card in Slot 7
Extended 80-Column Card in AUX. CONNECTOR Slot

You'll learn about these and other peripheral devices in Chapter 6.

Slot 3: Avoid putting a card in slot 3 if you have a card in the AUX. CONNECTOR slot. Slot 3 was the 80-column card slot in earlier models of the Apple II, and, for purposes of software compatibility, a card in slot 3 will override a card in the AUX. CONNECTOR slot.

Need More Power? Many devices—including printers, monitors, and modems—need to be plugged into three-hole, grounded outlets. If you have more than two devices that need to be plugged into the wall, you should get a **power strip**. A power strip, available at any electronics store, is like a wall socket with four to eight outlets. Many power strips have an ON/OFF switch, so you can turn all your devices on and off with one switch.

Stacking Peripherals

The Apple IIe and Apple peripherals are designed to take up the smallest possible amount of desk space. You might want to put the DuoDisk on top of the Apple IIe and the monitor on top of the DuoDisk as shown in Figure 1-17.

Figure 1-17. Stack Your Peripherals

Chapter 1 Summary

Hardware refers to the computer, disk drive, monitor, and other peripheral devices.

Software refers to the instructions, called programs, that tell the computer what to do. Programs are recorded on disks.

Peripheral devices are things, like printers, that you can connect to your computer.

General Installation Tips

Remember these tips when installing peripherals:

- Make sure the Apple IIe power is off and that the power cord is unplugged.
- Make sure the bare sides of peripheral cards face the power supply.
- Install cards by rocking them back to front. Don't touch the gold fingers on the bottom of the card.
- Put cards in their recommended slots (printer card in slot 1, modem card in slot 2, mouse card in slot 4, ProFile™ card in slot 5, disk drive card in slot 6, co-processor card in slot 7, 80-column card in AUX. CONNECTOR slot).
- Make sure the pins on one connector line up with the holes on the other connector.

Chapter 2

Getting Started

The best way to learn about the Apple IIe is to start using it. So look for the disk labeled *An Introduction* (on the flip side of *The Inside Story*). This program will give you practice using the keyboard, and will teach you some computer concepts and procedures common to hundreds of other Apple IIe programs.

Starting Up An Introduction

Starting up is sometimes called **booting**.

Follow these steps for starting up *An Introduction*:

1. Open drive 1 by pushing in on the latch as shown in Figure 2-1. The disk drive door will pop up. If you find a cardboard insert inside, remove and discard it. (While you're at it, check drive 2 for a cardboard insert and discard it too.) From now on, the only thing you should put in your disk drive is a disk—and only one disk at a time.

Which Is Drive 1? On a DuoDisk, drive 1 is the drive on the left. If you have two or more Disk II disk drives, drive 1 is the disk drive connected to the set of pins labeled DRIVE 1 on the controller card in slot 6 inside the Apple IIe case.

2. Put the disk into the disk drive as shown in Figure 2-2. Hold the disk by the **label**. Make sure the *An Introduction* label is facing up, and that the label is the last part of the disk to enter the disk drive.
3. When the disk is all the way inside, push down on the latch until you hear it click shut. (See Figure 2-3.) This step is important. If you forget to close the disk drive door, the program won't run.

Figure 2-1. Open Disk Drive Door

Figure 2-2. Put Disk in Disk Drive

Figure 2-3. Close Disk Drive Door

4. Turn on the monitor (or TV) power switch. See Figure 2-4.
5. Reach around the left side of the computer and find the power switch in the lower-left corner. Press the upper half of the switch to turn on the power. (The first time you do this, you may have to crane your neck and look for the power switch, but eventually you'll learn to do it by touch.) See Figure 2-5.

Figure 2-4. Turn on the Monitor

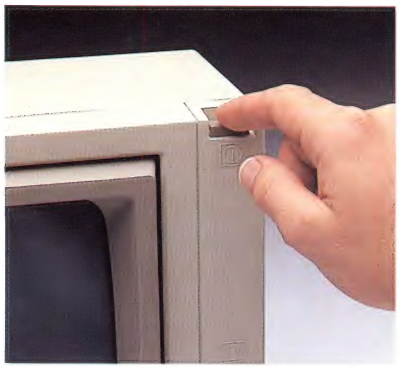


Figure 2-5. Turn on the Apple IIe Power

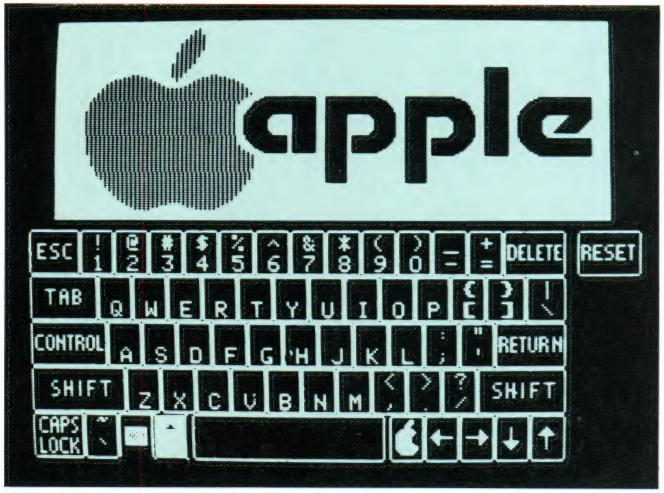
When you turn on the power, several things will happen at once:

- You'll hear a beep.
- The **power light** (on the bottom row of the keyboard) will light up.
- The light on the disk drive will light up.
- You'll hear a whirring sound from the disk drive.

What's Going On? Every time you turn on the power, your Apple IIe will check drive 1 for a **program disk** (a disk with instructions telling it what to do). If it finds a program disk in drive 1, it copies the program into the **memory** of the computer and starts carrying out the instructions in that program one by one. In this case, the program is an educational one, *An Introduction*, but the startup procedure is the same no matter what program you're using.

When the whirring stops, you should see the **display** shown in Figure 2-6. If you don't see the right display, consult the troubleshooting section that follows. If your display matches the one in Figure 2-6, put the manual aside for awhile and learn to use your Apple IIe by following the instructions on the screen. Then come back here when you finish.

Figure 2-6. *An Introduction* Startup Display



Troubleshooting

You'll find a complete troubleshooting guide in Appendix B, but here are some common problems in starting up. See if you can find a description of your problem in the left-hand column, then follow the remedy procedure in the right-hand column.

No sound from the disk drive.	Turn off the power and make sure your disk drive is connected according to the instructions in Chapter 1.
No picture on the screen.	Try adjusting the **contrast knob** on your monitor. If that's not the problem, make sure your monitor is connected to your Apple IIe, that your monitor is turned on, and that your monitor is plugged in.
Power light on keyboard doesn't come on.	Make sure your Apple IIe is plugged in. If you're using a power strip, make sure the power strip is plugged in and turned on.
"Wrong" disk drive starts whirring.	The disk drive that whirs when you turn on the power is drive 1. Turn off the power, put *An Introduction* in drive 1 and start again.
Disk drive won't stop whirring.	Stop the disk drive by pressing (CONTROL)-(RESET), turn off the power, put the disk labeled *An Introduction* in drive 1, and start again.
You get the **message:** `I/O ERROR`.	Make sure you've got the right disk (*An Introduction*) in drive 1. If that's not the problem, turn off the power and make sure your disk drive is connected properly, and start again.

Welcome Back

Now take *An Introduction* out of the disk drive and put it back in its envelope for safekeeping, but leave your computer turned on. You'll be using it again in a little while. (The computer uses less power than a 100-watt light bulb, so you don't need to turn it off until you're finished using it for the day.)

Keyboard Review

As you discovered when you went through *An Introduction*, the computer keyboard looks like a typewriter keyboard, but it has several keys that typewriters don't have. Even the keys that look familiar can behave in strange and apparently magical ways if the programmer decides he wants them to. (In a **game program**, for example, you might be told to press the letter C when you want your electronic monster to eat Cleveland, and to press the letter D when you want him to crush Detroit. Typing C and D in a **word processing program** produces a considerably different result.) The best way to find out how the keys work in a given program is to read the manual that came with the program—but to give you a head start, here's a description of the most common uses for the special keys on the Apple IIe keyboard.

RETURN

Pressing RETURN means that you're ready to proceed. If you're typing something like a memo, pressing RETURN moves the **cursor** to the next line.

ESC

Pressing (ESC) usually gets you back to the **menu**. (ESC) is short for *escape*, and that's what it lets you do in most programs.

DELETE

With some programs, you can press (DELETE) to erase characters to the left of the cursor. (But be careful how you position the cursor before you press (DELETE) because it erases by **backspacing**. It doesn't erase the **character** under the cursor.)

Apple Lore: Early models of the Apple II didn't have a (DELETE) key, so don't be surprised if in some programs you press (DELETE) and nothing happens. If (DELETE) doesn't work in a particular program, the manual that came with the program will tell you how to erase characters some other way.

SHIFT and CAPS LOCK

The (SHIFT) key works just like the shift key on a typewriter. You hold it down while you type another key, and it gives you either the uppercase version of letter keys or the upper character on keys with two characters (like the number and punctuation keys in the top row).

If you want *all* capital letters, press (CAPS LOCK). When (CAPS LOCK) is locked down, all the letters you type are capitalized, but no other keys are affected. This makes it possible for you to type numbers and capital letters without pressing and releasing the shift key all the time.

Apple Lore: Early models of the Apple II didn't have a CAPS LOCK key because you didn't have a choice between uppercase and lowercase. Everything you typed came out capitalized. Consequently, programs designed for early models of the Apple II don't recognize lowercase letters. To get these programs to run correctly on your Apple IIe, you need to press CAPS LOCK down.

Keys That Move the Cursor

The cursor is a little square or dash that marks your place on the screen. It usually starts out in the upper-left corner of the screen and moves to the right with every character you type, showing you where the character you type next will appear. In many programs, particularly word processing programs, when the cursor reaches the end of a line, it jumps to the next line automatically (you don't have to press RETURN). This is called **wraparound**.

The Arrow Keys

If you discover a mistake in something you've typed, you can move the cursor to the mistake by using the **arrow keys** located in the bottom-right corner of the keyboard. Pressing ↑ moves the cursor one line up. Pressing ↓ moves the cursor one line down. Pressing ← moves the cursor one character to the left. And pressing → moves the cursor (surprise!) one character to the right.

Apple Lore: Early models of the Apple II didn't have up and down arrow keys, so programmers who needed to make the cursor move up and down took matters into their own hands and designated certain keys on the keyboard to accomplish that function.

Usually they designated a set of four keys (that formed a cross) to be the up, down, left, and right cursor moving keys. See Figure 2-7.

If you run across a program that uses these keys instead of the arrow keys, you'll know that you're dealing with a vintage Apple program. You won't have any trouble using the program on your Apple IIe—it will just take some getting used to.

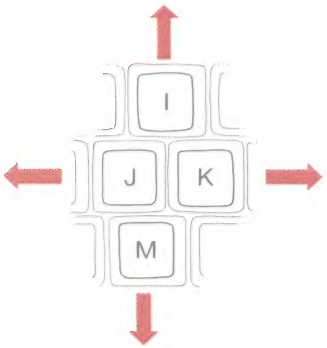


Figure 2-7. Arrow Substitutes in Some Programs

TAB

TAB is another key that moves the cursor (in some programs), but it doesn't move the cursor one character at a time. Pressing TAB moves the cursor forward a preset number of characters—usually eight. Some programs let you set your own tabs the way you can with a typewriter.

Keys That Control Other Keys

Programmers use CONTROL, ◌, and ● in combination with other keys to perform special functions in their programs.

For example, a program might tell you to press ◌-P in order to **print** something. Since key combinations vary from program to program, the only way to find out how a given program uses CONTROL, ◌, and ● is to read the manual furnished with the program.

There are, however, two key combinations that have predictable results:

- Pressing ◌-CONTROL-RESET restarts the computer. (You'll learn more about this later in Chapter 2.)
- Pressing ●-CONTROL-RESET starts a self-diagnostic test to see if the Apple IIe innards are in good-working order. The test lasts only about 20 seconds. During that time, moving patterns appear on the screen to let you know that the test is in progress. If the Apple IIe is healthy, you'll get the message `SYSTEM OK`. If you get any other message, consult your Apple dealer. (You don't need to perform this test unless you suspect something's wrong with your computer.)

Keys That Can Be Confusing

Typists sometimes use the letters *l* and *o* interchangeably with the numbers *1* and *0*. You can't do that when you're using a computer. The computer interprets numbers and letters very differently.

The SPACE bar is another key that can cause confusion. Pressing the SPACE bar inserts a space character. It's important that you think of a space as a character so you don't use it interchangeably with the right arrow which *appears* to produce the same result but doesn't.

Special Keys

Figure 2-8 highlights the special keys on the Apple IIe keyboard and summarizes their most common functions.

Figure 2-8. Special Keys on the Apple IIe Keyboard

(ESC): Gets you back to the menu.

(CONTROL): Used in combination with another key for some special effect.

(SHIFT): Used in combination with other keys to give uppercase letters or the upper character on two-character keys. Works just like a typewriter shift key.

(CAPS LOCK): When it's locked down, letters are capitalized, but no other keys are affected.

The power light: When it's lit, the power is on. This is where you attach your "Enhanced" sticker.

(SPACE) bar: Inserts a space character.

(): The "Open-Apple" key. It's used in combination with another key for some special effect.

The keys on your Apple IIe may look slightly different from the ones you see here, but they work the same way.

(Apple): The "Solid-Apple" key. It's used in combination with another key for some special effect.

(↑), (↓), (→), and (←): Move the cursor around the screen in the direction indicated on the arrow.

RETURN: Moves the cursor to the beginning of the next line, or tells the program you're ready to go on.

DELETE: Erases the character to the left of the cursor (in some programs).

RESET: Used in combination with CONTROL and (Apple), causes programs to restart.

Starting and Stopping the Apple IIe

There are two ways to start up Apple IIe programs. You use one method when the power is off, the other when the power is already on.

Starting Up With the Power Off

Here's a review of the first startup method:

1. Put a program disk in drive 1.
2. Turn on the monitor.
3. Turn on the Apple IIe power.

Figure 2-9. Starting Up When the Power Is Off

Starting Up With the Power On

Use this method of starting up a program, or switching from one program to another, when the power is already on. It reduces wear and tear on the power switch and other computer components.

1. Make sure the **disk drive light** is off, then take the last disk you were using out of drive 1.
2. Put the program disk you want to use into drive 1.
3. Hold down (Apple) and (CONTROL) while you press (RESET), then release all three keys, starting with (RESET). (If it seems a little awkward, you're doing it right. If it were more convenient, you might do it accidentally.)

Figure 2-10. Starting Up When the Power Is On

Turning the Power Off and On: If you insist on turning the power off and on as a way of switching from one program to another, wait at least 15 seconds from the time you turn off the power to the time you turn it back on to give the computer's memory a chance to clear.

If you'd like, you can practice the (Apple)-(CONTROL)-(RESET) method of starting up using the same disk you used before, *An Introduction*. When you see the title display, press (ESC) (unless you feel like going through the disk again).

Stopping

Stopping is a pretty intuitive procedure. You turn off the power to the monitor and you turn off the power to the Apple IIe. But there are a few things you should think about before flipping the power switch.

- **Save your work.** As you use your computer to write letters and such, a copy of your letter is kept in the computer's memory (much more on this later). But it's kept in memory only as long as the power is on. If you want a permanent copy of your composition, you must **save** it on a disk before turning off the power.
- **Don't turn off the power until the disk drive light is off.** The disk drive light tells you when the disk drive is **reading** (retrieving something) and **writing** (recording something) on the disk. If you turn off the computer while the disk drive light is on, you could damage the disk and lose some of the information recorded on it. Wait until the light goes out before you turn off the power. If something goes wrong (see Appendix B) and the disk drive light stays on for an inordinately long time, you can stop the disk drive by holding down (CONTROL) while you press (RESET).

All About Disks

Over time you'll accumulate two kinds of disks: disks that contain programs (instructions that tell the computer what to do), and disks that contain your **data** (the memos, budgets, lists, and other stuff you compose at the computer keyboard).

Initially, program disks are more expensive than the blank disks you use to store data. But once a disk contains your budgets and lists, it's worth as much as the time you spent entering the data in the first place. In either case, it pays to take good care of your disks and to make copies of important disks in case something ever happens to your original.

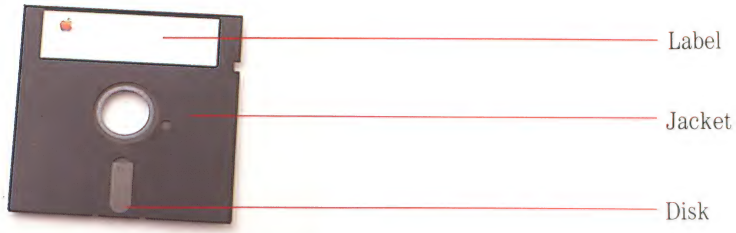
Anatomy of a Disk

Disks are circular sheets of plastic coated with metallic oxide. Information is recorded on them magnetically—much the way sound is recorded on cassette tape. They are sealed inside black, plastic **jackets** that protect them from fingerprints and dust.

As you discovered when you started up *An Introduction*, you're supposed to put disks in the disk drive—jacket and all. The disk spins inside the jacket, and as it spins, a honeycomb material inside the jacket cleans and lubricates the disk. Never remove a disk from its jacket (and expect to use the disk again). Of course, if it's worth a few dollars to you, go ahead and dissect a blank disk to see what's inside.

As the disk spins inside the jacket, every usable part of the disk passes under the **oval cutout** in the disk jacket where the disk drive's **read/write head** can get at it. Avoid touching the disk through the oval cutout or you defeat the purpose of the jacket.

Figure 2-11. Disk



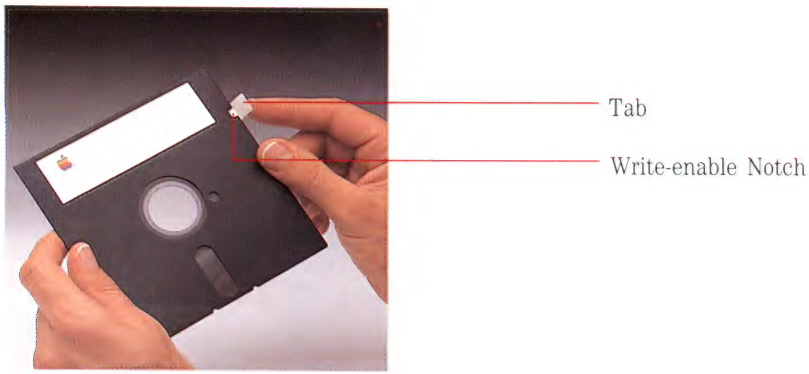
Both the DuoDisk and the Disk II drives are designed for 5 ¼-inch. single-sided, single-density disks.

The Write-Enable Notch

The notch in the upper-right corner of the disk jacket is called the **write-enable notch**. If that notch is covered, you can't write (save) things on the disk or otherwise change the contents of the disk. All you can do is read (load) things from the disk. If the notch is uncovered, you can write on it. (Writing doesn't take place through the notch. The notch just lets the disk drive know whether or not it's OK to write on the disk.)

Many programs that you buy don't have a write-enable notch because the manufacturer doesn't want you to change the contents of the disk by mistake. When you don't want the contents of your **data disks** changed by mistake, you can cover the write-enable notch with a removable **write-protect tab**. See Figure 2-12. (You'll find sheets of write-protect tabs packed with boxes of blank disks.)

Figure 2-12. Write-Protect Tab



Two-Sided Disks: The training disk packed with this manual has information recorded on both sides. That's possible because the disk is certified for double-sided use, and it's practical and economical for disks like this one that won't be used on a daily basis. Most disks are designed for single-sided use (the disk drive uses only one side of the disk at a time anyway), and you risk losing valuable programs and information if you use them any other way. Blank disks are cheap compared to the cost of reentering lost data, so don't cut corners by trying to use both sides of disks designed for single-sided use.

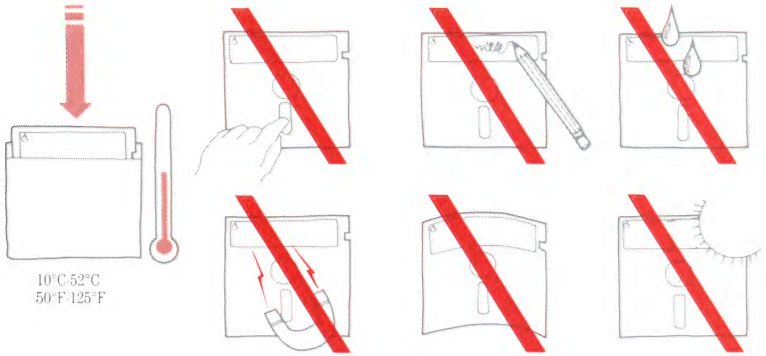
Always put single-sided disks in the disk drive with the label facing up. If the disk doesn't have a label, put it in the disk drive with the seams on the disk jacket facing down.

Care of Disks

Here are some general rules for handling disks:

- Don't touch the disk (the part that's visible through the oval cutout).
- Hold the disk by its label or any part of the jacket.
- Store disks in the envelopes they came in.
- Store disks vertically to keep dust from collecting on them.
- Use a felt-tip pen to write on the disk label. Using a pencil or a ball-point pen can put dents in the recording surface.
- Don't use an eraser on a label. Eraser dust can damage the disk.
- Don't attach paper clips to disks.
- Keep disks away from direct sunlight, moisture, and extremes of heat and cold. On a hot day, car trunks, dashboards, and glove compartments can be a disk's worst enemy.
- Keep disks away from magnets or devices like telephones, television sets, and large motors. (It's OK to lay them temporarily on the computer or disk drive.)

Figure 2-13. Care of Disks



If you follow these guidelines, your disks will last forever. (Actually they'll last an average of 150 hours of in-use time—which might as well be forever considering the few seconds it takes to load information from a disk.) If you don't follow these guidelines, you'd better hope you have a backup copy.

Copying Disks

Disks are sturdy enough to withstand hundreds of trips in and out of your disk drive, but they won't survive a single hot afternoon on the dashboard of your car. That's why it's critical that you take good care of your disks and make copies of important disks in case something ever happens to your original.

Disks That Can't Be Copied: Don't be surprised if you can't duplicate every program you buy. Many manufacturers **copy protect** (make it impossible to copy) their disks to protect themselves from **software pirates** who illegally duplicate and distribute their programs.

If a program you buy isn't copyable, the manufacturer generally provides one backup copy or tells you how to replace a damaged program disk at a nominal cost.

You'll find a program for copying disks on the *ProDOS User's Disk* that came with your disk drive. The program is relatively easy to use if you keep these points in mind:

- The program makes reference to your **source** and **destination volumes**. *Volume* is just another word for *disk*. The *source* volume is the disk you're copying from. The *destination* volume is the disk you're copying to (either a blank disk or a disk that contains expendible information).
- You'll be asked to supply the location of your source and destination volumes by their slot and drive numbers. The slot refers to the slot inside the computer that contains your disk drive controller card. If you followed the disk drive installation instructions in Chapter 1, the slot number will be 6. If you're using a DuoDisk, the drive on the left is drive 1, and the drive on the right is drive 2.
- When the program asks you for a slot or drive number, it supplies a **default** (preset) response. This default number will be used unless you type an alternative. To accept the default number, press (RETURN). To change the default, type over the character that appears on the display.

Copy An Introduction

Practice using the copy program on the *ProDOS User's Disk* by making a copy of *An Introduction*.

Important!

These instructions assume that you have a DuoDisk or a pair of disk drives. If you have a single disk drive, watch for instructions on the screen that tell you when to swap your source volume for your destination volume.

The Filer is a set of programs that let you copy, delete, and otherwise manipulate the information on disks. You'll also hear these useful programs referred to as *utilities*.

1. Start up the *ProDOS User's Disk*.
2. Press (F) (for PRODOS FILER <UTILITIES>)
3. Press (V) (for VOLUME COMMANDS).
4. Press (C) (for COPY A VOLUME). You'll see the display shown in Figure 2-14.

Figure 2-14. Copy a Volume Display

```
****************************************
*                                      *
*            COPY A VOLUME             *
*                                      *
****************************************

—COPY—
THE VOLUME IN SLOT: (6)
             DRIVE:

 TO VOLUME IN SLOT:
             DRIVE:

NEW VOLUME NAME:




—PRESS <RET> TO ACCEPT:<ESC> TO EXIT—
```

5. Press (RETURN) to indicate that your controller card is in slot 6.
6. Press (RETURN) to indicate that you'll be putting your source disk, *An Introduction*, in drive 1.
7. Press (RETURN) to indicate that your controller card is in slot 6.
8. Press (RETURN) to indicate that you'll be putting your destination disk in drive 2. If you don't have a second drive, type **1**. You'll see this message at the bottom of the display:

   INSERT DISKS AND PRESS <RET>

Only Got One Drive? You can make copies with a single disk drive—it just takes a lot longer. Watch for instructions on the display that tell you when to swap your source volume for your destination volume. If you need more guidance, follow the instructions for "Copy a Volume" in the *ProDOS User's Manual*.

9. Put your source disk, *An Introduction*, in drive 1 and your destination disk, a blank disk, in drive 2 and press (RETURN).

You'll hear some whirring and see the words **FORMATTING**, **READING**, and **WRITING** as the disk is being copied.

When it's all over, you'll see this message:

COPY COMPLETE

When you see that message, take your new backup copy of *An Introduction* out of drive 2 and label it with a felt-tip pen. (If you don't really want a backup copy of *An Introduction*, you can use the copy you just made as a destination disk the next time you need to copy something.)

Problems? If you have problems copying this or any other disk, consult the *ProDOS User's Manual*.

Chapter 2 Summary

Starting Up With the Power Off

1. Put a program disk in drive 1.
2. Turn on your monitor.
3. Turn on your Apple IIe.

Starting Up With the Power On

1. Put a program disk in drive 1.
2. Hold down (ó) and (CONTROL) while you press (RESET).

Special Keys

- (RETURN): Indicates that you've finished reading or typing something and that you're ready to proceed.
- (ESC): Gets you back to a previous menu or out of what you're doing.
- (DELETE): Erases characters to the left of the cursor.
- (↑), (↓), (→), and (←): Move the cursor.
- (CAPS LOCK): Capitalizes all letters automatically.
- (CONTROL), (ó), (): Make other keys behave differently.
- (TAB): Moves the cursor forward a preset number of characters (usually eight).
- (SPACE) bar: Inserts a space character.
- (SHIFT): Gives you the uppercase version of letter keys or the upper character on two-character keys.

Chapter 3

Application Programs

So far, you've been using the computer to learn about the computer. You can also use the computer to keep track of student's grades, write memos, prepare business reports, do job costing, keep personnel records, and learn foreign languages, among hundreds of other things.

The magic that transforms your computer from a teacher to a bookkeeper is the program you load into it. Programs designed for a particular purpose or application are called **application programs**. You can write them yourself (more on that in Chapter 5) or you can use ready-made programs as described in this chapter.

Popular Application Programs

In the next few pages, you'll learn about nine types of application programs. Table 3-1 gives you some idea of the applications most commonly used in homes, offices, and schools.

Table 3-1. Applications by Environment

	Business	School	Home
Accounting	■		
Communications	■	■	■
Data Base	■	■	■
Education		■	■
Entertainment		■	■
Graphics	■		■
Home Finance			■
Spreadsheet	■		■
Word Processing	■	■	■

Accounting Software

Accounting software does the same things a manual accounting system can do (general ledger, accounts receivable, accounts payable, payroll, inventory), but with much greater speed, accuracy, and control. The increased speed and accuracy allow you to get up-to-date reports about your financial position as you need them, instead of waiting for monthly or quarterly reports from your accountant.

A good accounting program can help you improve your cash flow management, boost your collection rate of receivables, plan payments to take advantage of vendor discounts, maintain inventory levels that minimize cash investment, and improve customer service.

Most accounting software packages are designed around a general ledger. The other modules (accounts receivable, for example) plug into the general ledger to allow automated posting. This modular approach allows smaller businesses to start with a general ledger package alone and add additional modules as they are needed.

Communications Software

A modem is a device that adapts or modulates computer signals so they can be sent to other computers over the phone lines. *Modem* is a contraction of the phrase *modulate/demodulate*. Modems are discussed in Chapter 6.

With **communications software** and a modem, you can exchange messages with other computers and information services over the phone lines.

Here are a few of the things you can do with communications software and a modem.

- Access hundreds of **data bases** (called **information services**) each with a library's worth of information.
- Exchange mail with colleagues (who are similarly equipped with a computer, communications software, and a modem).
- Share business data with colleagues.
- Transfer information between computers that would otherwise be incompatible.

- Bank by phone.
- Get information from the office's main computer while you work at home.
- Get the latest stock quotes from an information service.
- Shop by phone.
- Receive **public domain** (free!) software from a computer **bulletin board.**

Besides letting you communicate with computers across the country, communications software lets you communicate with computers across the room. See the "Communication Networks" section in Chapter 6.

Information Services

There are two kinds of information services: general purpose information services, like The Dow Jones News/Retrieval Service®, The Source℠, and CompuServe®, and specialized services for lawyers, journalists, stockbrokers, doctors, and others.

The Dow Jones News/Retrieval Service gives you up-to-the-minute information on 6000 corporations as well as current and historical stock quotes, money-market analysis and forecasts, news highlights from *The Wall Street Journal*, and even movie reviews.

The Dow Jones service is one of the "big three" general–purpose information services. The other two are The Source and CompuServe. Like the Dow Jones service, The Source and CompuServe offer news highlights and stock quotes, but business isn't their primary focus. With The Source and CompuServe you can, for example, check airline schedules and make reservations, do your shopping from computerized catalogs, do your banking, check the latest news, sports, weather, and movie reviews, exchange messages with other subscribers, and **download** (have the service send you) public domain (free) software.

If you're interested in one of these information services, ask your dealer how you can subscribe. He can tell you how to get your **user ID**, your **password**, and the local phone number of the information service that interests you.

Bulletin Boards

Bulletin boards came into being back in 1978 as a way for local computer club members to exchange messages with each other and share programs by phone. Today there are over 300 computerized bulletin boards in the United States, and you don't have to belong to a computer club to use one. All you need is a computer, a modem, communications software, and the phone number of your local **BBS (Bulletin Board System)**. You can get that from your computer dealer (in some cases, he'll be a **SYSOP**, the **system operator** of a bulletin board), from a computer club, or from one of the BBS articles that frequently appear in computer magazines.

Bulletin boards are popular for three reasons:

- They're free. You don't have to subscribe or pay for **connect time** the way you do with an information service.
- They're a source of free software—some of it professional quality, some of it hopelessly **bug-ridden**.
- They're a good way to meet people.

Data Base

Data base programs are for keeping track of lists of information: mailing lists, client information, inventories, addresses, phone numbers, test results, itineraries, medical and dental records—any information you now store on forms or index cards.

Data is a general purpose computer term for the numbers, words, and other raw information you feed into the computer.

Data is just a fancy word for *information*. A data base is a central clearing-house for information. Once you write your information into a data base program, you can retrieve the information any time you need it. You can also have the data base program cross reference that information with other information in the data base. For example, you can retrieve a list of all customers who placed orders last month, or a list of all students who scored 100% on at least one test.

Businesses use data base programs to keep track of customer records and inventory. You can use the same kind of program at home to keep a record of your valuables (for insurance purposes), to catalog your stamp or coin collection, to keep membership records for a club, to keep statistics on a sports team, and more.

Educational Software

Programs that teach are called **educational software**, or **courseware**.

Computers are good teachers because they give you a chance to learn at your own speed in an interactive, entertaining way. To give you an idea of how entertaining a computer program can be, there's a program that teaches touch typing in the guise of a shoot 'em up game. Letters and words are "fired" at your spaceship from the four corners of the screen, and you have to type the correct letter or word before the letters crash into your vehicle.

Educational software isn't just for kids. There are programs that help you prepare for college entrance exams and that tutor you in foreign languages for your next trip abroad.

Computer-Aided Instruction

Apple's version of the PILOT programming language is called SuperPILOT.

Teachers who want to try their hand at programming can use a programming language designed especially for educators called **PILOT**, short for *Programmed Inquiry, Learning, Or Teaching*. PILOT lets you design your own courseware, or **CAI** (Computer-Aided Instruction).

More About Apples in Education

To get an idea of the number and variety of educational software packages available for the Apple IIe, go to your local bookstore and thumb through one of the **software directories** that describe and rank Apple II software. Most software directories devote a whole chapter to educational software. At last count there were over 3000 educational programs available for the Apple IIe.

Entertainment

Don't be ashamed. Lots of people rationalize their purchase of a computer with talk of word processing and home budgets, but the first program they buy features a pair of jaws chasing gum drops through a maze.

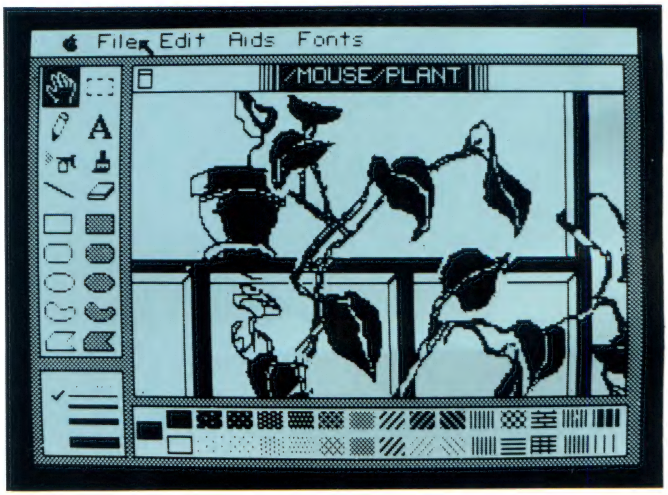
There are all sorts of games for the Apple IIe, ranging from computer **simulations** of board games like Chess to adventure games—sophisticated simulations that put you in a dungeon or on a remote island and challenge you to find the hidden treasure while avoiding monsters, booby traps, and other pitfalls.

Graphics

Business graphics programs convert numerical information—monthly forecasts, regional figures, departmental budgets—into presentation-quality bar, line, pie, and scatter graphs. Graphics generated with your Apple IIe can enhance presentations and even aid in business decisions because pictures are easier to digest than statistics.

Less business-like graphics programs, like **MousePaint™**, turn your monitor into an easel and your mouse into a paint brush, allowing you to create and save masterpieces. (See Figure 3-1.) A graphics program is to an artist what a word processor is to a writer—it encourages you to try out a variety of approaches before you commit your drawing to a **hard copy**. It makes it easy to revise and rearrange until you're completely satisfied with your creation. For less artistic types, there are graphics programs that come with a disk full of drawings that you can insert into greeting cards, signs, and banners.

Figure 3-1. MousePaint Graphics



Home Finance

Home finance programs let you play "what if..." with your home budget the same way electronic spreadsheet programs let financial planners play "what if..." with their multi-million-dollar corporate budgets. Here are some of the things you can do with a home finance program:

- Figure out mortgage payments and depreciation on your house.
- Keep track of tax and auto records.
- Prepare budgets for your church group or charity.
- Evaluate repayment schedules on a new home or car.
- Weigh the relative merits of money market, T-bill, stock market, and other investments.

Spreadsheet Programs

The first software best seller for personal computers was a program called VisiCalc® that computerized spreadsheets—those sheets of paper divided into rows and columns that are to business people what legal pads are to lawyers.

With the traditional spreadsheet, accountants and others who had to deal in numbers filled in their asset and liability figures in pencil. Then, with the help of a calculator, they arrived at the bottom line. If any number changed, or if they wanted to try out a different pricing strategy, it sent a ripple effect through the whole spreadsheet (which is why an eraser was as critical to using a spreadsheet as a pencil and a calculator).

With electronic spreadsheets, you still have to fill in your assets and liabilities, but by filling in formulas that define the interrelationships of all the assets and liabilities, you can try out different pricing scenarios and let the program do all the recalculating for you.

With electronic spreadsheets you can play "what if..." until the cows come home, or at least until your budget deadline rolls around. Spreadsheet programs take the drudgery out of financial planning and leave you more time for creative financing.

Templates: If you don't know how to figure out formulas for depreciation and such, you can get templates that furnish the formulas—so all you do is fill in a form.

Word Processing

They say that everyone is working on a screenplay or a novel these days, but even if you never write anything longer than a memo, a book report, or the minutes from a PTA meeting, you'll never use your typewriter again after you experience the ease of word processing.

Because it's so painless to edit with a word processing program, it encourages your best writing efforts. (So, if you aren't working on your novel now, you'll probably start one once you discover word processing.)

Here are just a few of the things you can do with a word processor:

- Change letters, words, and sentences without retyping those parts of the document that haven't changed.
- Delete words and sentences, and the document will rearrange itself to fill up the holes in the page.
- Move paragraphs if you think your report would work better that way.
- Change the margins of your document (after you've written it!) to make it look better or longer.

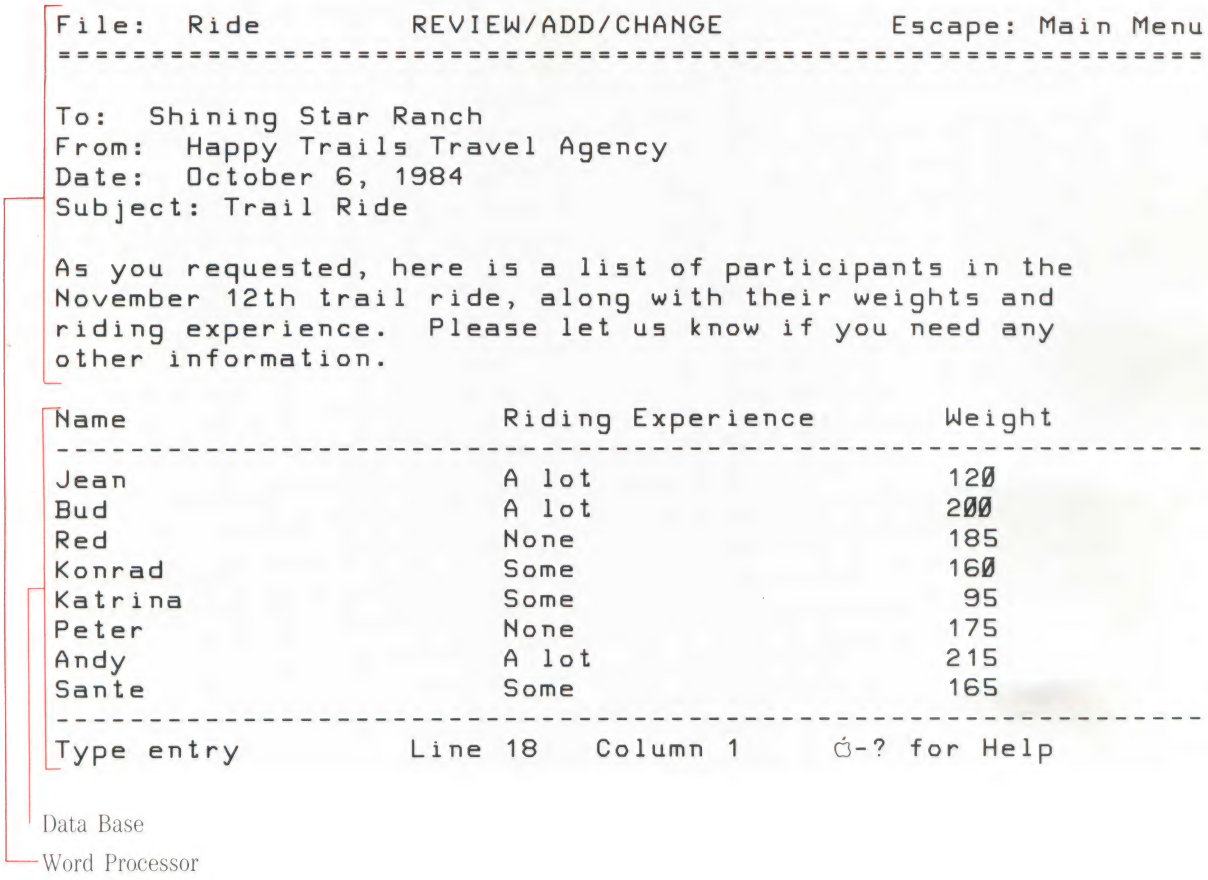
Need Help With Spelling? Some word processors come with companion programs that check and correct your spelling.

Integrated Software

Integrated software is a group of application programs (usually on one disk) designed to work together and share data. A typical integrated software package includes word processing, data base, and spreadsheet programs.

With integrated software, you can combine information created with different applications into one document. For example, you can write a report with a word processing program, and add a statistics section from a data base program and a budget section created with a spreadsheet program. See Figure 3-2.

Figure 3-2. Integrated Software


File: Ride REVIEW/ADD/CHANGE Escape: Main Menu
To: Shining Star Ranch
From: Happy Trails Travel Agency
Date: October 6, 1984
Subject: Trail Ride
As you requested, here is a list of participants in the November 12th trail ride, along with their weights and riding experience. Please let us know if you need any other information.
Name Riding Experience Weight
Jean A lot 120
Bud A lot 200
Red None 185
Konrad Some 160
Katrina Some 95
Peter None 175
Andy A lot 215
Sante Some 165
Type entry Line 18 Column 1 ⌘-? for Help
Data Base
Word Processor

Another advantage of integrated software is that the **commands** you learn for one application (like word processing) work the same way for the other applications on the disk. This shortens the time it takes you to learn the programs and makes you productive a lot faster.

Industry Specific Software

Industry specific software, also called **vertical market** software, is software that caters to a particular audience or profession. It's more expensive than general-purpose software, but much, much cheaper than hiring a **programmer** to write software from scratch.

For lawyers there are programs that handle billing, help with research, and keep track of court appearances and filing dates. For doctors there is data base software customized to deal with patient histories, to help diagnose illnesses, and to match allergy symptoms to causes. Other medical software handles billing and helps process insurance claims.

There are programs for manufacturing control, for scientific measurement and analysis, and for virtually any area where there is a specialized need for calculating or data sorting.

Vertical market software isn't always listed in software catalogs, but you can find out what's available by reading the software ads in professional journals, and by attending computer seminars sponsored by your professional organization. The American Bar Association, for example, has a Committee on Computers that sponsors **users groups** (computer clubs) for lawyers and promotes conferences and seminars on the use of computers in the legal profession.

Choosing Application Programs

By now you've probably thought of lots of ways you can use the Apple IIe to lighten your workload or help with your homework. The next step is to get some application programs and learn how to use them. If you have a task in mind, but don't know the type of application program that can handle it, talk to your dealer. The odds are he can help you because there's an application for any task imaginable—from tracking the space shuttle to tracking the acidity in your barrels of wine.

Build your software collection gradually, the way you build your book and record libraries. And choose software the way you choose books—on the recommendations of friends.

There are over 16,000 programs for the Apple II family of computers, some from Apple, many more from independent software developers. Ask your Apple dealer to help you choose the software that meets your needs.

Users Groups

If you don't know many people who use computers, you should consider joining an Apple users group. Computer-wise friends can cut your learning time in half and help you select the best software for your needs. Joining a users group can also save you some money—most users groups have a library of free, public domain software written by members of the group.

Ask your Apple dealer for the Apple users group nearest you or contact:

International Apple Core
908 George Street
Santa Clara, CA 95050
(408) 727-7652

Computer Books and Magazines

If you're too shy or too busy to attend users group meetings, you can find out a lot about the relative merits of different software packages by reading reviews in computer magazines and by flipping through one of several software directories available for the Apple II family of computers. Computer magazines are available at most newsstands. You'll find software directories in the computer section at most bookstores.

Behind the Scenes

The best application programs don't require you to know anything about how the computer works. Using them is as easy as using a typewriter or a toaster. You put the program disk in drive 1, turn on the power, and follow the instructions on the screen, as you did with *An Introduction*. But understanding how the computer works—how application programs give the computer its personality as a word processor or a spreadsheet, or how your memos, budgets, and personnel records are stored inside the memory of the computer—will boost your confidence and make you more productive and playful with your Apple IIe. Chapter 4 takes you behind the scenes and gives you the "inside story" on the Apple IIe.

Chapter 3 Summary

Application programs are programs designed for a particular purpose, such as budgeting, financial planning, or cataloging your butterfly collection.

Popular Applications

- Accounting: for automating your general ledger, accounts receivable, accounts payable, payroll, and inventory.
- Communications: exchanging information with other computers and computer services by phone.
- Data Base: for keeping track of lists (addresses, inventories, collections).
- Education: for learning.
- Entertainment: for fun.
- Graphics: for charts, graphs, drawings.
- Home Finance: for budgeting, portfolio management, tax planning.
- Spreadsheet: for financial planning.
- Word Processing: for generating letters, reports, books.
- Integrated Software: a collection of programs (usually word processing, data base, and spreadsheet) designed to share data.
- Industry-specific Software: programs designed for a particular audience (doctors, lawyers, and pig farmers).

Chapter 4

The Inside Story

When you connected your disk drive to your Apple IIe, you popped the top and got your first look at the **integrated circuits**, or chips, inside the computer. In this chapter, you'll learn what some of the chips do, and how they are used to process your data.

Start up *The Inside Story* to find out what makes your computer tick. If you don't remember how to start up a disk, review the instructions in "Starting Up With the Power Off," and "Starting Up With the Power On," in Chapter 2.

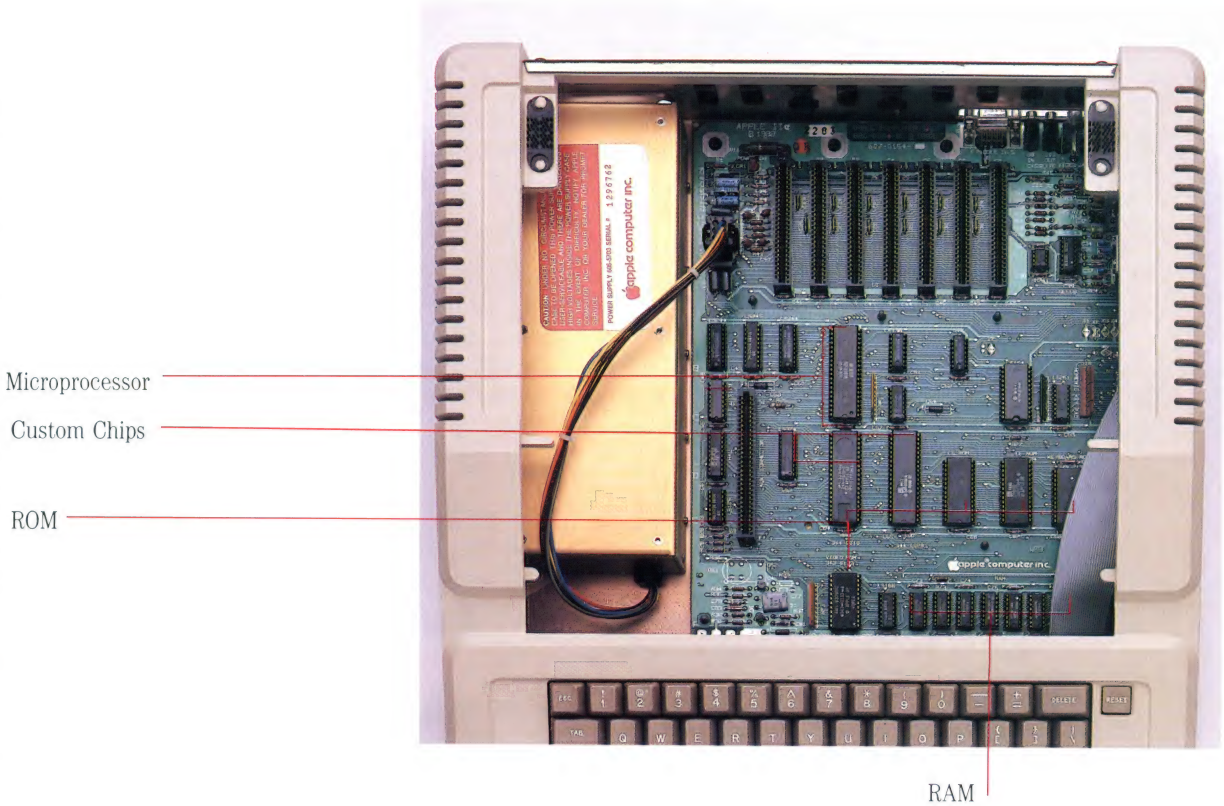
By the Way: The *Inside Story* is on the flip side of *An Introduction.* Make sure *The Inside Story* label is facing up when you put the disk in drive 1.

Parts of the Computer

Welcome back.

Here's a closer look at the components that put the Apple IIe through its paces.

Figure 4-1. Main Circuit Board



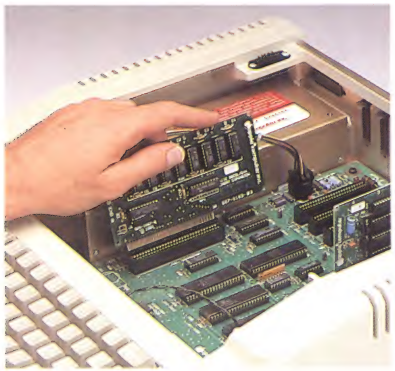
The Microprocessor

One of the most important chips on the main circuit board is the **microprocessor**. See Figure 4-1. The microprocessor is the brain of the computer system—the chip that carries out the instructions in the program one by one in the order that they appear. The Apple IIe has a 65C02 microprocessor.

RAM

The row of small chips highlighted in Figure 4-1 are called **random-access memory** chips or **RAM**. These chips store both the programs you load into the computer and the data you're working with (memos, budgets, personnel files, students' grades, and so on). The information in RAM is stored as electrical impulses—sort of like tiny light bulbs that can either be on or off. Each "light bulb" is called a **bit**, and it takes eight of these bits to express each character on the keyboard. A series of eight bits is called a **byte**. Because the information in RAM is stored electrically, it disappears when the power is turned off. That's why it's important to think of RAM as a temporary storage compartment.

Figure 4-2. Auxiliary Memory Card



The Apple IIe has 64K of RAM, which is roughly equivalent to 48 typed, double-spaced pages of text. You can add additional RAM by plugging an auxiliary memory card into the slot marked AUX. CONNECTOR on the main circuit board. See Figure 4-2.

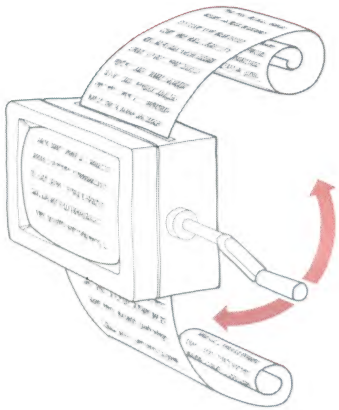
K: Computer memory is measured in K's, short for kilobyte. (A kilobyte is 1024 bytes.) As you know, one byte equals one character. 64K is 65,536 characters. Part of that 64K is taken up by the application program you're using. The rest is available to store the business report or budget you're working on.

This part of the computer's memory is called *random-access memory* because the microprocessor can access any location within RAM at random. It doesn't have to start at the first memory location and plod through until it reaches the location it's after.

RAM is sometimes called **main memory**, or just plain memory. Think of it as a grid of thousands of boxes, each identified by a number called its **address**. Each box can hold one piece of **code**—an instruction for the microprocessor, a character (the *H* in "Hello Mom," for example), or another address in memory (which tells the microprocessor to jump back to square 1—or wherever—and follow the instruction it finds there).

Scrolling: Of course there's a lot more room in memory than there is room on the screen to display it. Picture the information in memory as being written on a paper scroll, and the monitor's screen as a window in front of the scroll. To see a different part of the scroll, move the cursor to the bottom of the screen using the arrow keys. Press the arrow key again and a new line or column will come into view. This is called scrolling. See Figure 4-3.

Figure 4-3. Scrolling



ROM

Whereas RAM chips store both programs and information that change every time you use your computer (one day a letter, the next day a budget), ROM chips contain information that never changes. And unlike RAM, the information in ROM stays intact when the power goes off, which is just as well because one of the programs in ROM tells the microprocessor how to get started when the power is turned on.

In addition to the program that gets the computer started when the power first comes on, ROM contains a programming language called BASIC, an acronym for *Beginners All-purpose Symbolic Instruction Code*. BASIC is easy to learn because it lets you give instructions to the computer in a language similar to English. An **interpreter program**, also in ROM, then translates those English-like terms into **machine language**—a **binary** code of zeros and ones that is the only language the microprocessor can really understand.

Other Languages: There are other programming languages you can use with the Apple IIe (**Logo** and **Pascal**, for example), but they aren't stored in ROM. You have to load them into RAM from disks before you can write programs (the same way you have to load application programs into RAM before you can use them).

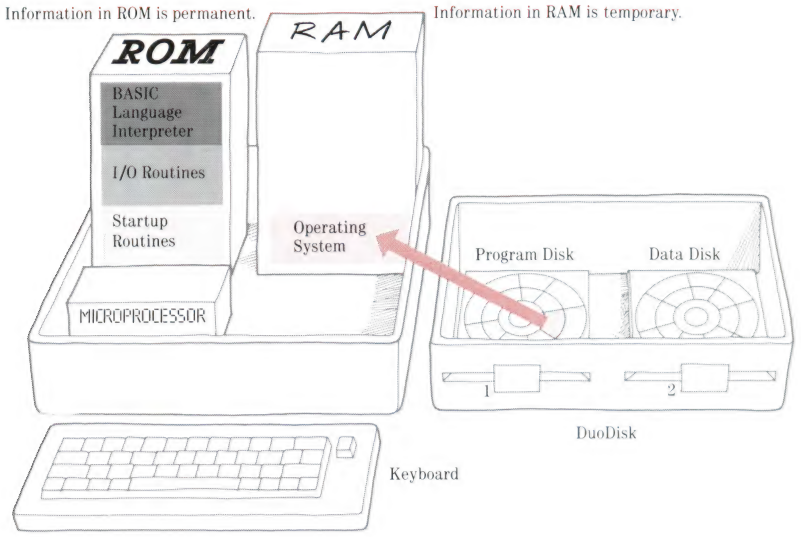
How It Works

Armed with this rudimentary knowledge of what RAM, ROM, and the microprocessor do, you'll be able to understand how programs are loaded into memory from disks, and how the information you create while using a program is saved on and retrieved from disks. You don't need to know everything about how the computer works to run programs successfully—anymore than you need to know how an internal combustion engine works to drive a car—but you'll use your computer with greater confidence and creativity once you have a feel for how programs and data move through the computer system.

Starting Up

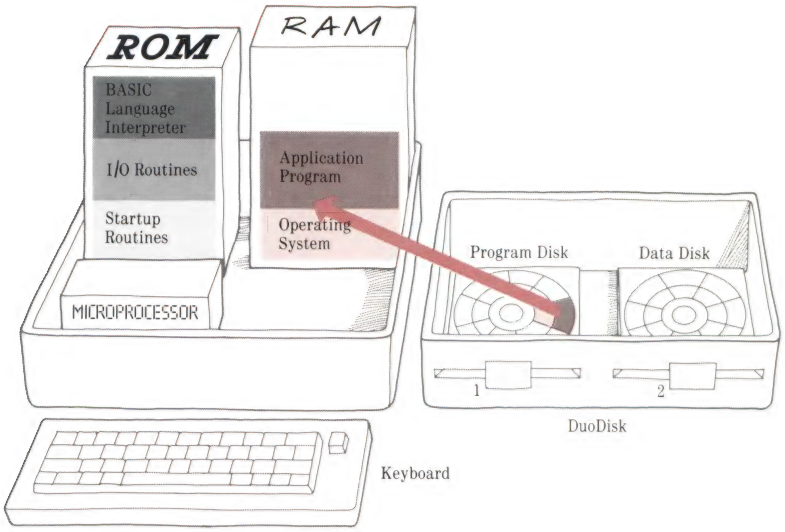
The first thing that happens when you flip the Apple IIe power switch is that a program in ROM tells the microprocessor to check drive 1 for a disk with an **operating system**. (See Figure 4-4.) An operating system is a set of instructions that tell the computer how to work with the information on disks. Because the operating system controls the way information is retrieved from and stored on disks, it is also called a **disk operating system**.

Figure 4-4. Operating System Is Loaded Into RAM



Once the operating system is in RAM, the operating system tells the microprocessor to load the application program into RAM. Once that happens, the computer takes on its personality as a Spanish teacher, a financial planner, or an arcade game, depending on what kind of program disk you have in drive 1. See Figure 4-5.

Figure 4-5. Application Program Is Loaded Into RAM



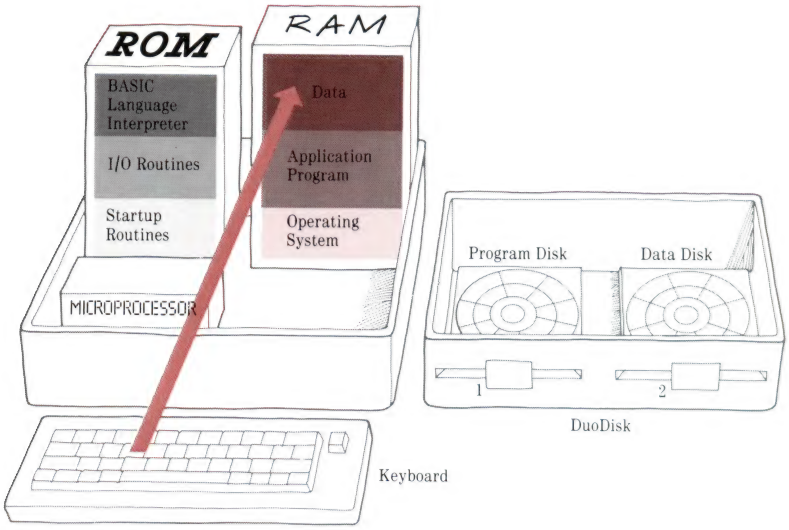
Booting is another word for starting up the computer.

Two-Stage Startup: Some programs, like *AppleWorks*, are too big to fit on one disk, so they come on two disks. The first disk, usually labeled the *Startup* or *Boot* disk, contains the operating system. The second disk, usually labeled the *Program* disk, contains the program. Starting up a two-disk program is called a **two-stage boot** or a **two-stage startup**. To execute a two-stage startup, all you do is put the **startup disk** in drive 1 and turn on the computer. A message on the screen will tell you to exchange the program disk for the startup disk and to press some key (usually RETURN) to start using the program.

Creating Something From Scratch

At this point, you start creating your letter or your budget, and everything you type (your data) is stored in RAM. See Figure 4-6.

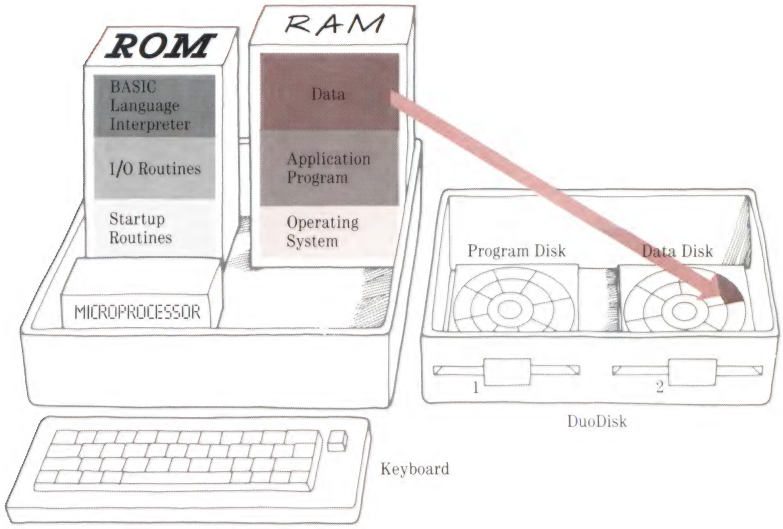
Figure 4-6. Creating Something From Scratch



Saving Data

It's important for you to remember that the information stored in RAM is only stored temporarily. Before you turn off the computer or switch to another program, you must save your work (data) on a disk. When you save your work on a disk, it's called a **file**, and you give it a **filename** by which you'll be able to retrieve it later.

Figure 4-7. Saving a File on a Disk



The application program you're using will tell you how to save a file onto a disk—usually it will simply be a matter of selecting the Save option from a menu, or typing a special key combination like (Ó)-(S) (for *Save*).

Figure 4-8. Save Is an Option on the Menu

```
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XX                                     XX
XX            GENERIC MAIN MENU        XX
XX                                     XX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

1.  START A FILE FROM SCRATCH

2.  GET A FILE FROM A DISK

3.  SAVE A FILE TO A DISK

4.  LIST FILES ON A DISK

5.  FORMAT A DISK


TYPE A NUMBER THEN PRESS <RETURN>

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

Revising an Existing File

You won't always be starting a document from scratch. Sometimes you'll be working with data that you entered on a previous occasion and saved on a data disk—data like students' grades, personnel records, and so on.

Here's how you get at that data:

1. You start up the application program you used to create the data in the first place.
2. You load the file, by its filename, according to the instructions that came with the application program. ("Load a File" will either be an option on the program's menu, or you'll use a special key combination like ⌘-L, for *Load*.)
3. You revise the data.
4. And you save the data, usually on the same disk you loaded it from.

Decisions, Decisions: When you save a revised file, you have the option of saving it with the same name you used before, or with a new name. If you save the revised file with the original filename, you write over (and lose) the original data. If you save the revised information with a new filename, both the original and the revised version are preserved on the disk.

Figure 4-9. Load Is an Option on the Menu

```
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XX                                    XX
XX            GENERIC MAIN MENU       XX
XX                                    XX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

1.  START A FILE FROM SCRATCH

2.  GET A FILE FROM A DISK

3.  SAVE A FILE TO A DISK

4.  LIST FILES ON A DISK

5.  FORMAT A DISK


TYPE A NUMBER THEN PRESS <RETURN>

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

If you forget what you named a file, most programs offer you some means of examining the contents of a disk. If you're lucky, there will be an option on the program's menu like "List Files on Disk." If there isn't such an option, you can use the List program on the *ProDOS User's Disk* that came with your disk drive.

Figure 4-10. List Files on a Disk

```
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XX                                    XX
XX            GENERIC MAIN MENU       XX
XX                                    XX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

1.  START A FILE FROM SCRATCH

2.  GET A FILE FROM A DISK

3.  SAVE A FILE TO A DISK

4.  LIST FILES ON A DISK

5.  FORMAT A DISK


TYPE A NUMBER THEN PRESS <RETURN>

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

In a Nutshell

That's the general idea of what happens every time you use an application program. Here it is in a nutshell:

1. You turn on the power, and a program in ROM tells the microprocessor to look for an operating system on the disk in drive 1.
2. The operating system is loaded into RAM.
3. The application program is loaded into RAM.
4. You start a document from scratch or you load something you created earlier and revise it.
5. You save your work on a disk (and print it).
6. You switch to a different program, you start creating a different document with the same program, or you turn off the power and quit for the day.

Program Disks and Data Disks

When you're using application programs, you're working with two kinds of disks: program disks and data disks.

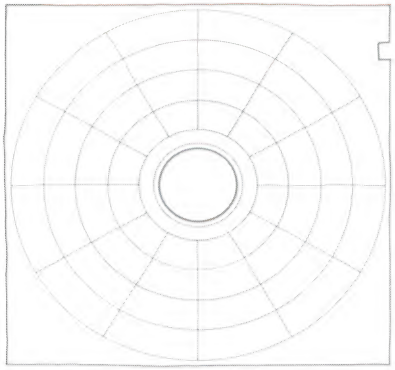
The program disk is the disk that contains the application program and the operating system. If you're lucky, it came with a manual that tells you how to use it, and with a backup copy of the program disk in case something happens to the original.

A data disk starts out as a blank disk that you buy by the box full from your Apple dealer. It becomes a data disk when you format it and start saving your data on it.

Figure 4-11. Program Disk and Data Disk

Formatting

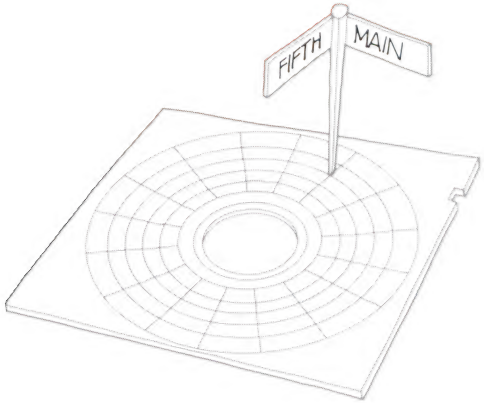
Figure 4-12. Formatting a Disk



Formatting a disk is a process that marks the disk off (magnetically) into sections where your data can be stored. These sections are numbered during the formatting process so the operating system will have a way of knowing where a particular file has been stored. Once a file is stored, its location is recorded in the disk's **directory** (or **catalog**) along with its name.

Think of formatting as laying down a network of roads on your blank disk. When information is stored on one of those roads, its address is recorded in the disk's equivalent of an address book. When the operating system needs to find a particular file, it checks the address book and learns that COMPANY.REPORT is located at the corner of Fifth and Main. You get the idea.

Figure 4-13. Conceptual View of Formatting



You need to format a disk only once. If you format a disk that has data on it, that data will be plowed under and paved over in the process of "laying out roads" on the disk. Reformatting disks is a good way to recycle disks that contain data you don't need anymore, but it's a disaster if you *do* need the data that was stored on those disks.

Reformatting a disk that contains important data is one of those little disasters that happens at least once to everyone who's ever used a computer. It's the reason you make backup copies of every data disk.

Many application programs offer formatting as one of the options on the program's menu. See Figure 4-14.

Figure 4-14. Formatting Is an Option on the Menu

```
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XX                                     XX
XX            GENERIC MAIN MENU        XX
XX                                     XX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

1.  START A FILE FROM SCRATCH

2.  GET A FILE FROM A DISK

3.  SAVE A FILE TO A DISK

4.  LIST FILES ON A DISK

5.  FORMAT A DISK


TYPE A NUMBER THEN PRESS <RETURN>

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

If your application program doesn't give you a way to format disks—and if your application program uses the ProDOS operating system—you can use the formatting program on the *ProDOS User's Disk* that came with your disk drive. The *ProDOS User's Manual* explains how to format disks.

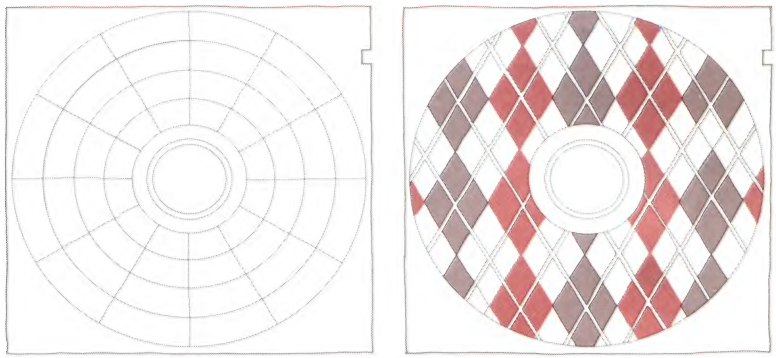
Formatting Disks for the Right Operating System

It all sounds pretty straightforward. There's only one potential pitfall. There are three different Apple IIe operating systems:

- ProDOS™—Short for *Professional Disk Operating System*
- DOS 3.3—Short for *Disk Operating System*, version 3.3
- Pascal—An operating system designed for programs written in the Pascal programming language.

And each operating system has a different way of formatting disks. If you format a disk for ProDOS and the program you're using has the DOS 3.3 operating system, it won't know how to store information on or retrieve information from that disk. See Figure 4-15.

Figure 4-15. Different Operating Systems Use Different Formats



You won't run into this problem if your program disk has a formatting option on the menu. But some programmers don't give you a way to format data disks on the program disk. (Either they ran out of space on the program disk or they didn't think it was necessary.) They expect you to use the formatting program on something called a **utilities disk**.

Utilities

Utility disks are disks like the *ProDOS User's Disk* that contain a variety of general-purpose programs that let you do things like copy files, copy the contents of whole disks, list the directories of disks, rename files, check disks for flaws that could sabotage your data, and format disks.

Each operating system has its own set of utility programs. ProDOS utilities are on the *ProDOS User's Disk*. DOS 3.3 utilities are on the *DOS 3.3 System Master* disk. Pascal utilities are on the Pascal system disks. Your Apple dealer can tell you how to acquire the appropriate utilities disks, but most of the time the utilities you need will be right on the application program disk itself (especially if it's a Pascal-based program).

Assuming your program doesn't include a formatting option, how can you tell which operating system your program uses so you know how to format your data disks? Often the operating system will be printed on the label of the program disk, or will be mentioned in the program's manual. If it's not, consult your dealer or the developer of the program for guidance.

Backing Up Your Data

When you save data on a disk, it's a good idea to make copies of your data on two separate disks. Making an extra copy takes only a few seconds, and it will save hours if anything happens to your original.

It's also a good idea to save your data frequently. If you type for an hour without saving your work, a power failure or a friend tripping over the power cord will erase everything in RAM. If you get in the habit of saving your work every ten minutes (and after every particularly inspired entry), you can smile in the face of power failures and clumsy friends.

Keeping two copies as you go along is one good backup strategy. You can also copy disks at the end of the day using the "Copy a Volume" program on the *ProDOS User's Disk* (see Chapter 2). You'll learn more about copying disks in the *ProDOS User's Manual* that came with your disk drive.

By the Way: The Copy a Volume program will not only copy ProDOS disks, but also DOS 3.3 and Pascal disks.

Chapter 4 Summary

Main Parts of the Computer

- Microprocessor: Does the computing. Carries out the instructions in computer programs.
- RAM: Short for *random-access memory*. This is where programs and data are stored temporarily. Whatever is in RAM goes away when the power goes off.
- ROM: Short for *read-only memory*. Permanent memory. Contains, among other things, information the computer needs to get started.

Four Steps to Using a Computer

1. Starting up: Put a program disk in drive 1 and turn on the power.
2. Creating information: Use the keyboard to create letters, budgets, charts.
3. Saving information: Give what you've created a name and store it in a file on a disk for permanent storage.
4. Retrieving information: Load information from a file back into memory where you can change the contents of the file or send the contents of the file out to a printer to produce a paper copy.

Chapter 5

Programming

12050 PRINT "TR
12060 EFLAG = 1
12070 GOTO 12150
12080 W = W / 16
12090 OF W <= 70 THEN 12150
12100 PRINT
12110 PRINT CHR$ (7); CHR$ (7);
PRIORITY MAIL"
12120 PRINT "TRY ONE OF THE AIR EXPRESS COMPANIES"
12130 EFLAG = 1
12150 RETURN
59999 REM UTILITY ROUTINES
60000 REM KEYSTALL
60010 VTAB 24
60020 INVERSE
60030 PRINT "PRESS ANY KEY TO GO ON...";
60040 GET A$
60050 NORMAL
60060 RETURN
61000 REM MONEY FORMATTER
61010 T$ = STR$ (T)
61020 OF T = INT (T) THEN T$ = T$ + ".00"
61030 OF ASC (RIGHT$ (T$,2)) = 46 THEN
T$ = T$ + "0"

Writing a computer program involves taking a task, breaking it down into small steps that the computer can perform, and expressing those steps in terms the computer can understand.

There are lots of computer languages, and each language has its virtues. Some are particularly suited to scientific applications; others are better for business applications; still others are indispensible for creating fast-paced arcade games. BASIC, Logo, and Pascal are three programming languages especially suited to beginners.

BASIC (an acronym for *Beginners All-purpose Symbolic Instruction Code*) is easy to learn because it allows you to write instructions for the computer in English-like words and phrases. It has the additional advantage of being built into your computer, so there are no special disks to buy. And BASIC was the first language built into personal computers, so you'll find hundreds of books on the subject and many people who "speak" the same language.

There are several dialects of BASIC. The Apple IIe dialect is called **Applesoft** BASIC.

In this chapter, you'll get a chance to write some simple BASIC programs so you can see what programming is all about and whether it's something you want to pursue further. The BASIC vocabulary you learn won't apply to other computer languages, but the principles will.

You Don't Have to Learn to Program: There's an application program for almost every imaginable application, so you don't have to learn programming to use a computer, but a lot of people learn for the fun and the challenge of it.

If you decide you'd like to learn more about BASIC, you can get the *Applesoft Tutorial* and the *Applesoft BASIC Programmer's Reference Manual* published by Apple, or you can choose books from another publisher more suited to your age, your area of interest (games, graphics, and so on), and your level of programming expertise (from tutorials to technical reference manuals). If you prefer a more interactive learning experience, you can get an Applesoft BASIC training course on disks, similar to the interactive training programs that came with this manual, or you can enroll in a programming class at your local college.

If you decide you'd rather program in Logo, Pascal, or some other language, ask your dealer for the appropriate language disks, manuals, and other training materials.

Getting Into BASIC

In an earlier chapter, you learned that Applesoft BASIC is built into your Apple IIe—that it's stored permanently in ROM. But how do you get at it? One way to get at it is to start up the *ProDOS User's Disk* and select the last option on the Main Menu—**APPLESOFT BASIC**. Here's how:

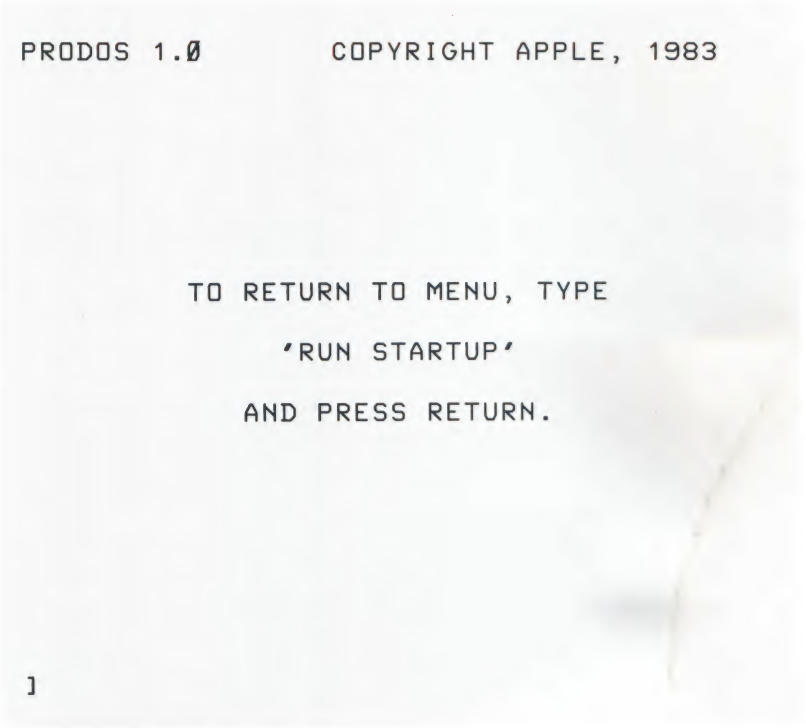
1. Start up the *ProDOS User's Disk*. You'll see this display:

Figure 5-1. *ProDOS User's Disk* Startup Display

```
****************************************
*                                      *
*          PRODOS USER'S DISK          *
*                                      *
* COPYRIGHT APPLE COMPUTER, INC. 1983  *
*                                      *
****************************************

YOUR OPTIONS ARE:

      ? - TUTOR: PRODOS EXPLANATION

      F - PRODOS FILER (UTILITIES)

      C - DOS <-> PRODOS CONVERSION

      S - DISPLAY SLOT ASSIGNMENTS

      T - DISPLAY/SET TIME

      B - APPLESOFT BASIC

PLEASE SELECT ONE OF THE ABOVE
```

2. Press (B) to select **Applesoft BASIC**. You'll see this display:

Figure 5-2. Applesoft BASIC Startup Display



This loads ProDOS (the Applesoft BASIC operating system) into memory and puts you into the BASIC programming environment.

The square bracket near the bottom of the screen is called a **prompt**. It's called a prompt because it prompts you for information. The blinking square is a cursor. The cursor shows you where the characters you type will appear on the screen.

Why Do You Need a Disk to Load BASIC? You don't really need to start up the *ProDOS User's Disk* to get into the BASIC programming environment. You could turn on the Apple IIe power without a disk in the disk drive, press (CONTROL)-(RESET) to stop the disk drive, and start programming. The problem is that you wouldn't be able to save any of the programs you write, and you wouldn't be able to load previously written programs from a disk into memory. The reason is that while BASIC is built into ROM, the operating system (which controls how information is saved on and retrieved from disks) is not. Starting up the *ProDOS User's Disk* loads the ProDOS operating system.

BASIC Vocabulary

In this section, you'll learn to use the following statements and commands:

- PRINT: Displays information on the screen so you can communicate with the person using your program.
- INPUT: Gives you a way to ask the person using your program for information and use that information in the program.
- LET: Defines a **variable**.
- NEW: Erases memory so you can start programming with a clean slate.
- END: Tells the computer that the program is finished.
- LIST: Displays the program in memory.
- RUN: Starts the program that's in memory.
- SAVE: Stores your program in a file on a disk.
- LOAD: Transfers a copy of a program on a disk into memory.
- CAT: Short for *Catalog*. Displays a list of what's on a disk.

ProDOS Commands: SAVE, LOAD, and CAT are ProDOS operating system commands that you'll use when you're writing BASIC programs.

The PRINT Statement

PRINT statements are used to communicate with the person using the program. (The words in application program menus, on startup displays, and in error messages were all put there by the programmer by using PRINT statements—assuming the program is written in BASIC.) Here's how the PRINT statement works in a BASIC program:

- You type a number.
- You type **PRINT**.
- Then you type, within quotation marks, the word or phrase you want displayed. (It doesn't matter whether you use uppercase or lowercase.)
- Then you press (RETURN).

Try it by typing this:

Be sure you type the number **1**, not a lowercase **l**.

```
1 PRINT "THIS IS MY FIRST PROGRAM."
```

and pressing (RETURN).

Line Numbers: Every line in a BASIC program has a number in front of it; these tell the microprocessor the order in which to carry out the instructions in the program.

Now type **RUN** and press (RETURN).

If all goes well, the phrase that you typed within quotation marks should appear without quotation marks on the line under the word **RUN**. Your text display should look like this:

```
1 PRINT "THIS IS MY FIRST PROGRAM."
RUN

THIS IS MY FIRST PROGRAM.
```

Pressing (RETURN) lets the computer know when you've completed a line or instruction. Since you have to do it after every line in a BASIC program, you won't be reminded each time. From now on, just remember: when you've finished typing a line or an instruction, be sure to press (RETURN).

Fixing Mistakes: If you make a mistake while you're programming in Applesoft BASIC, use (←) to back up to the scene of your error, then type over it, and use (→) to get back to the end of the line. (DELETE) won't work while you're in the BASIC programming environment.)

If you discover a typing mistake after pressing (RETURN), just retype the line.

SYNTAX ERROR: If you hear a beep and get the message **SYNTAX ERROR**, it means that you misspelled a BASIC command or statement, like PRINT, and the program doesn't know what you're talking about, or else it means you left out a quotation mark. If you get such a message, don't panic, just retype the line.

DOS 3.3 Requires Uppercase: DOS 3.3, another Applesoft BASIC operating system, accepts only uppercase statements and commands. ProDOS accepts instructions in either uppercase or lowercase.

Combining Statements to Create a Program

NEW clears memory, but doesn't clear the screen. **HOME** clears the screen, but doesn't clear memory.

Now that you know how to fix mistakes, type **HOME** to clear the screen, type **NEW** to clear your one-line program from memory, then try typing this slightly longer program. Don't forget to press (RETURN) after every line.

```
1  PRINT "ROSES ARE RED"
2  PRINT "VIOLETS ARE BLUE"
3  PRINT "THIS IS AS EASY"
4  PRINT "AS TYING YOUR SHOE"
5  END
```

(The END statement lets the computer know that the program is finished.)

When you finish typing your program, try it out by typing **RUN**. The result should look like this:

```
ROSES ARE RED
VIOLETS ARE BLUE
THIS IS AS EASY
AS TYING YOUR SHOE
```

Notice that line 1 was executed first, then line 2, then line 3, and so on. It doesn't matter in which order you type the lines; the computer will carry them out from lowest to highest line number.

Don't forget to press (RETURN) at the end of each line or instruction.

If you don't believe it, type **NEW** (to clear the computer's memory), then retype the program in a different sequence, like this:

```
NEW
3  PRINT "THIS IS AS EASY"
1  PRINT "ROSES ARE RED"
5  END
4  PRINT "AS TYING YOUR SHOE"
2  PRINT "VIOLETS ARE BLUE"
```

Type **RUN** and see what happens.

Replacing Statements

If you decide you want to replace one of the statements in your program with another, all you have to do is type the number of the line you want to replace and the new statement. You don't need to retype the whole program. Try typing this:

```
1 PRINT "ROSES ARE PINK"
```

Now type **RUN**.

Notice that your new line 1 replaces your old line 1, but all the other lines remain the same.

Erasing Statements: To erase a whole line, just type the line number without a statement. For example, to get rid of the line **VIOLETS ARE BLUE**, you'd type **2** with no text following it, then press (RETURN).

Inserting Statements

Suppose you wanted to insert a PRINT statement between line 1 and 2. You'd be out of luck. You'd have to renumber every line in your program because there's no room between lines 1 and 2. That's why it's considered good programming practice to number your program by tens (10, 20, 30 instead of 1, 2, 3). That way there's room for you to insert anything you find you've left out in the first go-round.

The LIST Statement

Suppose you want to look at all the program statements after you've typed them into memory. You can do it using the LIST statement.

The LIST statement shows all the program lines in memory in numerical order. Even if you originally typed them starting with line 4 and ending with line 1, they'll appear in order when you type the LIST command.

Type `LIST`.

Is That All There Is?

The PRINT statement is pretty straightforward, but by itself it doesn't do much for you. If all you wanted to do was type sentences on the screen, you'd use a word processing program, not a bunch of PRINT statements. The PRINT statement is only powerful when you use it in conjunction with other statements like INPUT and LET.

Before you learn about INPUT and LET, erase your first program from memory.

Type `NEW`

Don't Worry: Before you learn to write long and useful programs, you'll learn how to save them on disks so they won't be lost when you erase them from memory.

Variables

Remember how that first disk you used asked for your name, then used it, like an old friend, on every possible occasion? That little trick was done with variables. Variables are place holders—letters or words that hold a place for some piece of information that the person using the program will provide.

The programmer who wrote that program didn't know what your name would be, so he assigned a variable to that piece of information and used the variable every time he wanted the program to use your name.

Once he tricked you into revealing your name, he told the program to take that input (your name) and use it in place of the variable throughout the program.

So how do you tell the computer that you want to replace a certain variable with a name or other input? One way is to use an INPUT statement. Here's how it works. The program asks a question, like:

```
10 PRINT "WHAT'S YOUR NAME?"
```

The next line of the program is an INPUT statement that includes a variable, like:

```
20 INPUT N$
```

(The dollar sign tells the program that the input will be a word. If the input will be a number, you leave the dollar sign off.)

Try typing the first two lines of this little program:

```
NEW
10 PRINT "WHAT'S YOUR NAME?"
20 INPUT N$
```

Now run the program and type a response to the question that appears on the screen.

Type **RUN**

The name you typed is now stored under the variable **N$**. Watch what happens when you include the variable **N$** in a PRINT statement later in the program. Type this:

```
30 PRINT "NICE TO MEET YOU "N$
```

(Don't forget the space after **YOU**, and make sure that the variable **N$** is outside the quotation marks.) Then type

```
40 END
```

Now run the program. If all goes well, the program should ask you for your name, then use your name in place of the variable **N$**, like this:

```
WHAT'S YOUR NAME?
?NANCY
NICE TO MEET YOU NANCY
```

INPUT statements let you define variables from the keyboard. (In other words, the user's typed **input** becomes the value of the variable.) But sometimes you need to define a variable from within the program, as in the following example:

```
NEW
10 PRINT "HOW OLD ARE YOU?"
20 INPUT A
30 LET D = A * 365
40 PRINT "THAT MAKES YOU APPROXIMATELY "D
50 PRINT "DAYS OLD!"
60 END
```

A is a variable for the person's age in years. D is a variable for the person's age in days.

* is the BASIC symbol for multiplication. You'll learn more about BASIC calculations in this chapter.

In this example, LET defines the variable D as the user's response to the question "How old are you?" times 365—the number of days in a year. (This simple program assumes everybody was born on January 1st. When you become more experienced at programming, you can calculate the exact number of days—including extra days for leap years!)

Feel free to type the age program and try it on your friends. (Don't forget to press (RETURN) at the end of each line.) For a challenge, you might want to change it so it calculates a person's age in months instead of days! Don't forget to type NEW before you enter your new program.

Naming Variables

You can use single letters like A, D, and N$ as variables, or you can use whole words like AGE, DAYS, and NAME$. The advantage of using whole words is that it's easier to remember what they represent. The only drawback to using words as variables is that BASIC uses only the first two characters of a variable name to distinguish one variable from another. To BASIC, the variable DAYS is the same as the variable DARK, so be sure the first two characters of your variables are unique.

BASIC Reserved Words: As you're writing programs that use variables, avoid the following words and abbreviations and any words that include these words, like LETTER. (They're either Applesoft BASIC commands or ProDOS commands.) If you forget and use one of these commands as a variable by mistake, BASIC will try to use it as a command with unfortunate results.

&	EXP	LOG	RND
-	FLASH	LOMEM:	ROT=
ABS	FLUSH	MID$	RUN
AND	FN	NEW	SAVE
APPEND	FOR	NEXT	SCALE=
ASC	FP	NORMAL	SCRN(
AT	FRE	NOT	SHLOAD
ATN	GET	NOTRACE	SIN
BLOAD	GOSUB	ON	SPC(
BRUN	GOTO	ONERR	SPEED=
BSAVE	GR	OPEN	SQR
CALL	HCOLOR=	OR	STEP
CAT	HGR	PEEK	STOP
CATALOG	HGR2	PEL	STORE
CHAIN	HIMEM:	PLOT	STR$
CHR$	HLIN	POKE	TAB(
CLEAR	HOME	POP	TAN
CLOSE	HPLOT	POS	TEXT
COLOR=	HTAB	POSITION	THEN
CONT	IF	PR#	TO
COS	IN#	PREFIX	TRACE
CREATE	INPUT	PRINT	UNLOCK
DATA	INT	READ	USR
DEF	INVERSE	RECALL	VAL
DEL	LEFT$	REM	VLIN
DELETE	LEN	RENAME	VTAB
DIM	LET	RESTORE	WAIT
DRAW	LIST	RESUME	WRITE
END	LOAD	RETURN	XDRAW
EXEC	LOCK	RIGHT$	XPLOT

Don't worry if most of these commands are unfamiliar to you. You need to know only a handful of them to get a feel for programming in Applesoft BASIC. If you want to learn more, get the *Applesoft Tutorial* and the *Applesoft BASIC Programmer's Reference Manual.*

Getting Ready to Save Programs on a Disk

So far, you haven't lost a lot by erasing the programs you've written by typing **NEW**. But as you become more proficient, your programs will get much longer than the samples in this book. Before you go any farther, you'd better learn how to save your programs on a disk so you won't have to retype them every time you turn on the computer.

Formatting

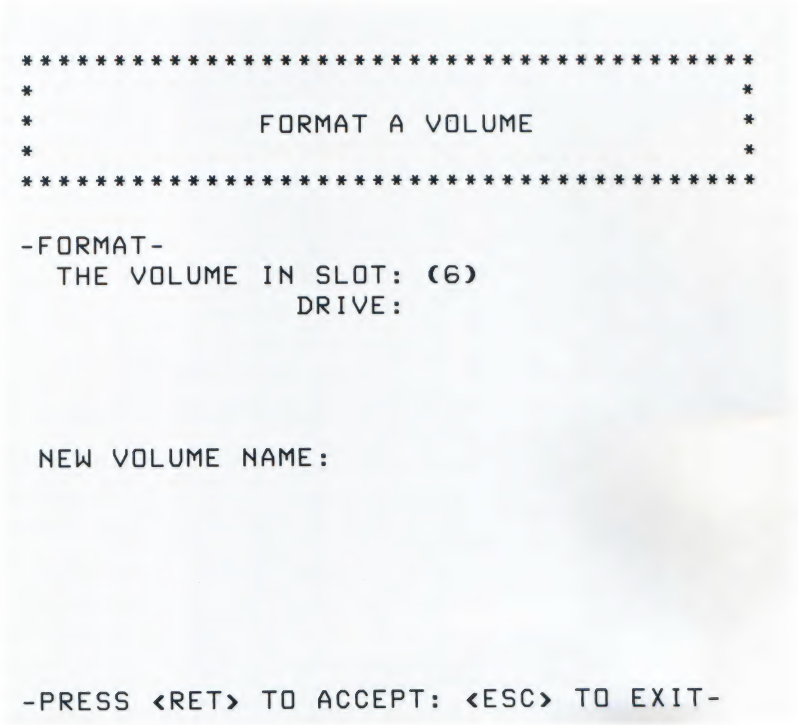
As you learned in the last chapter, before you can save anything on a blank disk, you have to format it. Applesoft BASIC uses ProDOS, so stop what you're doing and format some disks using the formatting program on the *ProDOS User's Disk*. (The same disk you used to get into Applesoft BASIC—it's probably still in your disk drive.)

1. Start up the *ProDOS User's Disk*.

Or Restart: Use the (Apple)-(CONTROL)-(RESET) method if your Apple IIe is already turned on.

2. Press (F) (for **PRODOS FILER**) from the Main Menu.
3. Press (V) (for **VOLUME COMMANDS**) from the Filer Menu.
4. Press (F) (for **FORMAT A VOLUME**) from the Volume Commands Menu. You'll see the display shown in Figure 5-3.

Figure 5-3. Format a Volume Display



The program wants to know the location of the disk you'll be formatting. You'll need to supply both the drive number (either 1 or 2) and the slot number (most likely 6). *Slot* refers to the slot inside the computer that contains your disk drive controller card. It will be slot 6 if you followed the disk drive installation instructions in Chapter 1 of this manual. The number in parentheses on the display is a default setting (the programmer's calculated guess as to the information you'll supply). It's called a default setting because it will be used by default unless you supply an alternative. You can accept the default setting by pressing (RETURN). You can change the default setting by typing over it.

Important!

These instructions assume you have a DuoDisk or two disk drives. If you have a single disk drive, be sure to take your *ProDOS User's Disk* out of your disk drive and replace it with the disk you want formatted.

5. Put the disk you want to format (a blank disk or a disk that contains information you no longer want) in drive 2. (If you have only one disk drive, take out the *ProDOS User's Disk* and replace it with the disk you want to format.)
6. Press (RETURN) to accept the default (slot 6), or type a different slot number.
7. Type **2** to change the default setting from drive 1 to drive 2.
8. Press (RETURN) to accept the default disk name. The default name will be **/BLANKXX** (where **XX** is a number between 00 and 99). If you have some other name in mind, just type over the default. Your disk name must start with a slash (but that's provided for you), then a letter. The rest of the name can be made up of letters, numbers, or periods, but you can't use spaces or other punctuation, and the name can't be longer than 15 characters. Press (RETURN) when you finish typing the disk name.

If you're formatting a previously formatted disk, you'll get a message like this:

```
DESTROY '/XXX'? (Y/N)
```

(where **/XXX** is the name of the disk you're about to reformat). If you knew you were about to format /XXX, and are willing to lose all the information stored on that disk, press (Y) (for *yes*) and the formatting will begin.

If you don't want to destroy /XXX by reformatting it, press (N) (for *no*) and there's no damage done.

If the disk you're formatting has never been formatted before, and all is well, you'll hear some whirring, then you'll see this message near the bottom of your screen:

```
FORMAT COMPLETE
```

Remove the formatted disk from the disk drive and label it with its new name and its operating system (ProDOS).

If something goes wrong during the formatting procedure, you'll see an error message. If you're not sure what the message means, or what to do about it, consult the error message appendix in the *ProDOS User's Manual*.

Saving a Program on a Disk

Now that you've got a formatted disk, get back into the BASIC programming environment by restarting the *ProDOS User's Disk* and selecting option B (to accept Applesoft BASIC); then type the following program into memory as you did before:

```
NEW

10 PRINT "HOW OLD ARE YOU?"
20 INPUT A
30 LET D = A * 365
40 PRINT "THAT MAKES YOU "D
50 PRINT "DAYS OLD!"
60 END
```

To save this program, put your formatted disk in drive 1 and type **SAVE**, followed by the name you want to give your program. For example:

```
SAVE AGE
```

and press (RETURN).

If you want to save the program on a disk in drive 2, put your formatted disk in drive 2 and type

```
SAVE AGE,D2
```

and press (RETURN).

After you use **,D2**, drive 2 becomes the default disk drive. After that, you have to use **,D1** to access a disk in drive 1. The default drive setting reverts to drive 1 the next time you start up the computer.

You'll know your program is being saved when you hear the appropriate disk drive whir. Once your program is stored safely on a disk, you can turn off your computer secure in the knowledge that your program is accessible to you anytime you want to amaze and astonish your non-programming friends.

Naming Programs: You can name your program anything you want, within these guidelines:

- Maximum of 15 characters long.
- Must begin with a letter.
- Numbers, letters, periods (no other punctuation) permitted.
- No spaces permitted.

Different operating systems and different application programs have slightly different (usually more liberal) rules, but if you follow these, you can't go wrong.

Running Your Program

When you want to use a program that's stored on a disk, all you have to do is start up the *ProDOS User's Disk* and select the Applesoft BASIC option, put the disk that contains your program in drive 1, then type **RUN AGE** (or whatever you named your program).

If you want to run a program from a disk in drive 2, type

```
RUN AGE,D2
```

and your program is off and running.

If you want to load a program into memory but don't yet want to run it, type **LOAD**, and then the name of the program.

Cataloging a Disk

After you've written and saved several programs on a disk, you may have trouble remembering what you named each of them. If you find that you've forgotten the names of the programs on your disk, type `CAT` (or `CAT,D2` if the disk is in drive 2).

`CAT` is short for *Catalog*.

You'll see a display like this that tells you, among other things, the name of the programs on the disk and how much space they take up on the disk.

Figure 5-4. Typical Catalog

```
/MYPROGRAMS

 NAME                TYPE   BLOCKS   MODIFIED

 PUZZLE               BAS       40   <NO DATE>
 AGE                  BAS        1   <NO DATE>
 PRACTICE             BAS       11   <NO DATE>
 PAZAZZ               BAS       14   <NO DATE>
 RAIN                 BAS        6   <NO DATE>

BLOCKS FREE:   208        BLOCKS USED:   72

]
```

Creating a Self-Starting Program

Programs that you buy don't require you to type **RUN**. They just start running when you put the program disk in the disk drive and turn on the power.

If you'd like a program you've written to be a self-starter, you can make it self-starting by following these steps:

1. Format a disk (for ProDOS)
2. Copy the files PRODOS and BASIC.SYSTEM from the *ProDOS User's Disk*. (You'll find instructions for copying files in the *ProDOS User's Manual* that came with your disk drive.)
3. Copy your program onto the disk and give it the name STARTUP.

Starting up this disk loads ProDOS, puts you into BASIC, and runs your program.

It's Your Turn

This section presents two sample programs along with complete explanations of how they work.

Converting Miles to Kilometers

Here's a program that converts miles to kilometers.

Program Line	Explanation
`10 PRINT "THIS PROGRAM CONVERTS"` `20 PRINT "MILES TO KILOMETERS."`	Describes what the program does.
`30 PRINT "HOW MANY MILES"` `40 PRINT "DID YOU TRAVEL";`	Prints your request for information. The semicolon instructs the computer to leave the cursor on the current line rather than move it to the next line.
`50 INPUT MILE`	Puts **?** on the screen. Whatever number you type is stored in a variable named **MILE**. Note that because of the semicolon in line 40, the question mark appears on the same line as the question.
`60 LET KILO = MILE/.62137`	Creates a variable named **KILO**, which is equal to **MILE** (the number you enter) divided by .62137.
`70 PRINT "YOU TRAVELED ";KILO;` `80 PRINT " KILOMETERS."`	Prints what's inside the first set of quotation marks, then prints the value of **KILO**, then prints what's inside the quotation marks in line 80.
`90 END`	Signals the end of the program.

Once you've typed the program, you can try it by typing:

```
RUN
```

Here's what you'll see:

```
THIS PROGRAM CONVERTS
MILES TO KILOMETERS.
HOW MANY MILES
DID YOU TRAVEL? 3
YOU TRAVELED 4.82804127 KILOMETERS.
```

Spacing? If the spacing on your screen isn't exactly right, you may have forgotten to type a space inside one of the PRINT statements. To retype a line, type the line number of the line you want to correct, then type the new statement.

You can save this program on your newly formatted disk by typing **SAVE** followed by a name, like **KILO**. Then, when you want to load the program, simply type **RUN KILO**.

Write Your Own Conversion Programs: You can use PRINT and INPUT statements (and this program as a guide) to write programs that convert any measurement you can think of (as long as you know the conversion formula). Try Celcius to Fahrenheit or inches to millimeters.

Crazy Sentences

This program uses INPUT statements to create a silly story. Each time you run the program, the sentence the program creates will be a little different (unless you always type the same responses).

Don't Forget to Clear Memory: Before you try another program, don't forget to clear the computer's memory by typing **NEW**.

Program Line	Explanation
`10 PRINT "COLOR";`	Prints a request for a color. The semicolon tells the computer not to go on to the next line.
`20 INPUT C1$`	Displays ? on the screen. Whatever color you type is stored in the variable **C1$** (pronounced "see-one-dollar"). The word *color* cannot be used as a variable name because it's an Applesoft BASIC reserved word.
`30 PRINT "ANOTHER COLOR";`	Prints a request for a second color.
`40 INPUT C2$`	Displays ? on the screen. Whatever color you type is stored in the variable **C2$**.
`50 PRINT "NAME";`	Prints a request for a name.
`60 INPUT N1$`	Displays ? on the screen. Whatever name you type is stored in the variable **N1$**.
`70 PRINT "ANOTHER NAME";`	Prints a request for a second name.
`80 INPUT N2$`	Displays ? on the screen. Whatever name you type is stored in variable **N2$**.
`90 PRINT`	Prints a blank line.

`100 PRINT "THE ";C1$;" ROBOT"`
`110 PRINT "WITH THE ";C2$;" EYES"`
`120 PRINT "GRABBED ";N1$;" WHILE"`
`130 PRINT N2$;" RAN FOR HELP."`
	Prints what's inside the quotation marks interspersed with the colors and names you assigned to the variables.

`140 END`	Signals the end of the program.

After you type **RUN**, your display will look something like this:

```
COLOR?  GREEN
ANOTHER COLOR?  PURPLE
NAME?  ROY
ANOTHER NAME? HEATHER

THE GREEN ROBOT
WITH THE PURPLE EYES
GRABBED ROY WHILE
HEATHER RAN FOR HELP.
```

You can use this same program to create your own sentences. In fact, you may want to write a program that creates a whole story.

Important!

When you choose variable names, be sure that you don't choose a word that is an Applesoft BASIC reserved word. Not even part of a variable can be a reserved word. For example, a variable can't be named *LETTER* because the reserved word *LET* is part of the name.

Reserved words are listed earlier in this chapter.

And don't forget the two-character rule: Applesoft BASIC looks at only the first two characters of a variable name. If in the Crazy Sentence program the variables were named NAME1$ and NAME2$, Applesoft BASIC would have created only one variable.

Printing Your Programs on Paper

If you have a printer connected to your computer, you can print a copy of your program on paper using the LIST command. This is useful in **debugging** programs. Here's how:

1. Turn on your printer.
2. Type **PR#1** to direct all information to your printer.
3. Type **LIST**
4. Type **PR#Ø** to send information back to the screen instead of to the printer.

PR What? PR#1 is shorthand for "print to the device attached to slot 1."

You've Only Begun to Program

Now that you've made your way through this chapter, you know enough to write a few simple BASIC programs. To go further with Applesoft BASIC, ask your Apple dealer for the *Applesoft Tutorial*. It's a gentle introduction to BASIC that shows you how to write programs that produce animated color graphics, in addition to programs like the ones in this chapter that manipulate words and numbers. From there, you can graduate to the *Applesoft BASIC Programmer's Reference Manual*, a two-volume set that is the BASIC programmer's primary source of information on the Applesoft BASIC programming language.

Using the Computer as a Calculator

When you're in the BASIC programming environment, you can use your Apple IIe as a calculator. Try it; type this:

```
PRINT 2+2
```

and press (RETURN).

If all went well, you should see the result of the calculation under your print statement, like this:

```
PRINT 2+2
4
```

You don't have to preface your PRINT statement with a line number because you don't want to use the calculation in a program—you just want to *print* the results of the calculation on the screen.

Here are the Applesoft BASIC equivalents of the addition, subtraction, multiplication and division symbols and some sample calculations. Practice using these symbols now (and any time you need to do some calculations and don't have your pocket calculator handy). Don't forget to start your calculation with the word PRINT.

+ addition
- subtraction
* multiplication
/ division

```
PRINT 5+2
7

PRINT 5-2
3

PRINT 5*2
10

PRINT 5/2
2.5
```

More Elaborate Calculations: You can combine several calculations in one PRINT statement. Use parentheses to indicate which calculations you want performed first. For example: `(9+4)*3`. Without parentheses, the result of the calculation would be 21. With parentheses, the result is 39.

A Shortcut: If you like, you can use a question mark (?) in place of the word PRINT. For example, you can type `? 2+2` instead of `PRINT 2+2`. Either way, you'll get `4` as a result.

Quick Calculations: If you ever just want to use your Apple IIe for some quick calculations, you don't have to go to the trouble of starting up the *ProDOS User's Disk*. All you have to do is start up the Apple IIe without a disk in drive 1, press CONTROL-RESET to turn off the disk drive, and start typing your calculations.

Don't use this way of getting into BASIC if you plan on writing and saving a program! Starting up without a disk in drive 1 and pressing CONTROL-RESET gets you into BASIC, but it doesn't load ProDOS, and without an operating system, your computer doesn't know how to communicate with your disk drive.

Other Computer Languages

BASIC is just one of the programming languages available for the Apple IIe. The following sections briefly introduce a few other popular computer languages available for the Apple IIe. Your Apple dealer will be able to suggest particular packages and manuals for each programming language.

Logo

Logo is a programming language that is especially suited to children and beginning programmers of any age because it's great for creating computer graphics. Using simple commands like FORWARD, LEFT, and RIGHT, you learn to write programs that produce elaborate and colorful geometric designs. Logo encourages you to learn by trial and error because mistakes are so painless. If you make a mistake, the worst that can happen is that you'll get a geometric design other than the one you intended, and half the time the result is better than your original plan. But Logo does more than let you create graphics. You can use it for fun or for serious applications.

Pascal

Named after Blaise Pascal, a 17th-century philosopher and mathematician, this language is used in high school and college computer classes to teach programming because it stresses a systematic approach to programming. You break programming problems down into tasks and subtasks, and then write your program in manageable-sized chunks.

6502 Assembly Language

This language is one small step up from the language of electrical impulses that is the native tongue of the Apple IIe. It's a lot harder to learn than languages like Logo and BASIC that use English-like commands, but it gives you faster programs because it doesn't need as much translation for the computer to understand it, and it gives you more control over the operation of the computer.

Other Languages

Ask your dealer for information on other programming languages available for the Apple IIe like COBOL, FORTRAN, SuperPILOT, FORTH, C, PL/1, LISP, Modula-2.

Chapter 5 Summary

Writing a computer program involves breaking a task down into small steps and expressing those steps in terms the computer can understand.

Some BASIC Vocabulary

- PRINT: Displays information on the screen.
- INPUT: Lets you interact with someone using your program.
- LET: Defines a variable.
- END: Tells the computer the program is finished.
- NEW: Erases whatever is in memory.
- HOME: Erases whatever is on the screen.
- LIST: Displays the program in memory.
- RUN: Executes the program in memory.
- CAT: Short for *catalog*. Displays a list of what's on a disk.
- SAVE: Stores your program in a file on a disk.
- LOAD: Transfers a copy of a program on a disk into memory.

ProDOS Commands: SAVE, LOAD, and CAT are ProDOS operating system commands that you'll use when you're writing BASIC programs.

Computer as Calculator

Because BASIC is built into the Apple IIe, you can use your computer as a calculator. (To get into the BASIC environment quickly, press CONTROL-RESET after starting up your Apple IIe without a disk in the disk drive.) Here are the mathematical symbols the computer understands:

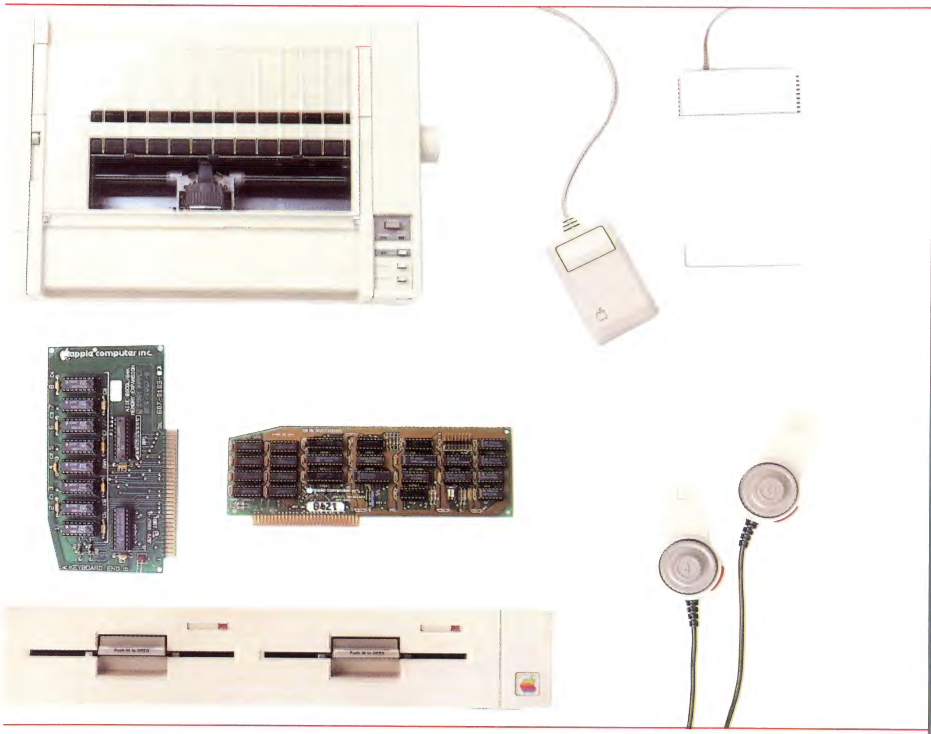
+ addition
- subtraction
* multiplication
/ division

Popular Programming Languages

- Logo: Easy and fun to learn (with lots of emphasis on graphics), yet powerful enough for serious programming.
- BASIC: Beginners All-purpose Symbolic Instruction Code is built into the Apple IIe and many other personal computers, so there are lots of people who speak the same language. BASIC is good for beginners because it resembles English and is easy to learn.

Chapter 6

Adding to Your System



A **peripheral device** is a device that's connected to a computer, like a printer, or a disk drive.

Just as there are all sorts of application programs you can get for your computer, there are dozens of peripheral devices that can make your computer more useful. The following sections give you an idea of typical **system configurations** for school, home, and office use.

Different Configurations

Read about the configuration that best applies to you. If you want to know more about any of the peripheral devices mentioned, you'll find sections later in this chapter that describe each peripheral device in detail.

School Configuration

A typical school configuration might consist of an Apple IIe, a monitor, a disk drive, and a mouse.

A color monitor is ideal for schools because most educational software uses color to engage and hold students' attention, but it's not a requirement—software will run just fine on a television set or a monochrome monitor.

For many applications, a single disk drive is inadequate because you spend a lot of time exchanging your program disk for your data disk, but it's not a problem with most educational software because students can use the educational programs for drill and practice without saving their work on a disk.

While it's not a requirement for most educational software, a mouse is a desirable peripheral device for school systems because mouse-based programs are easier to learn and more intuitive than keyboard-based programs.

Figure 6-1. Typical School Configuration

Computer Networks

To save money, and to keep track of who's doing what at which computer, many computer classrooms link a number of Apple IIe's into a computer **network**. A network allows a class full of students with Apple IIe's to share the disk drives and printer at the instructor's computer. With many networks, the instructor can control which programs, lessons, and tests each student receives, view any student's work, and send messages to individual students "over the wire."

To bolt the Apple IIe top down, get two 3/4-inch-long thread-cutting screws, size 6/32.

About Kids and Computers: Most kids are fearless about computers and think nothing of popping the top of the Apple IIe and rearranging the circuitry just to see what will happen. To discourage these overzealous **hackers**, there are screw holes on the Apple IIe cover so classroom computers can be bolted shut.

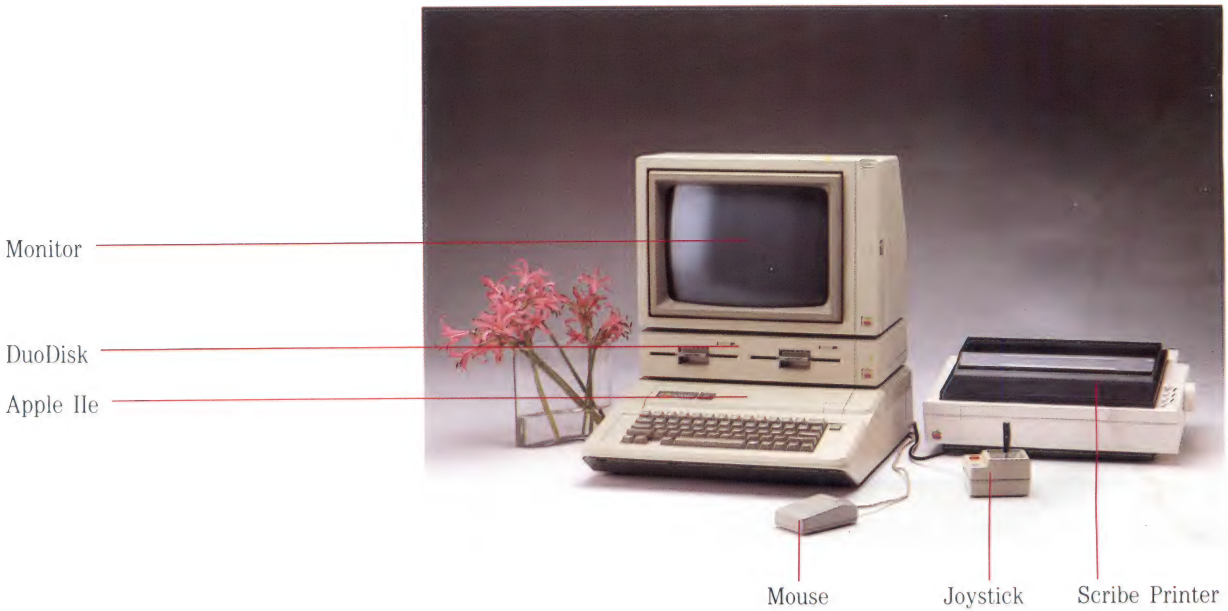
Home Configuration

A typical home system might consist of an Apple IIe, a monitor or TV set, a DuoDisk, a mouse, a **thermal** or **dot matrix printer**, and a **joystick**.

This gives you all the equipment you need to do word processing, home finance, and other *serious* home applications. By attaching an RF modulator to your color television, you can swap your monitor for your TV when you want to play computer games or use educational programs that are more fun and effective in color.

Add a modem to your system if you want to use your computer for home banking and other applications that involve communicating with other computers over the telephone lines.

Figure 6-2. Typical Home Configuration



Business Configuration

A typical office system might consist of an Apple IIe, a monitor, a DuoDisk, a ProFile, a **daisy wheel printer**, a mouse, a modem, and one or more specialized cards.

Office applications, especially accounting and data base programs, involve a staggering amount of data. A **mass-storage device**, like the **ProFile**, can store the equivalent of dozens of floppy disks and save you a lot of disk swapping.

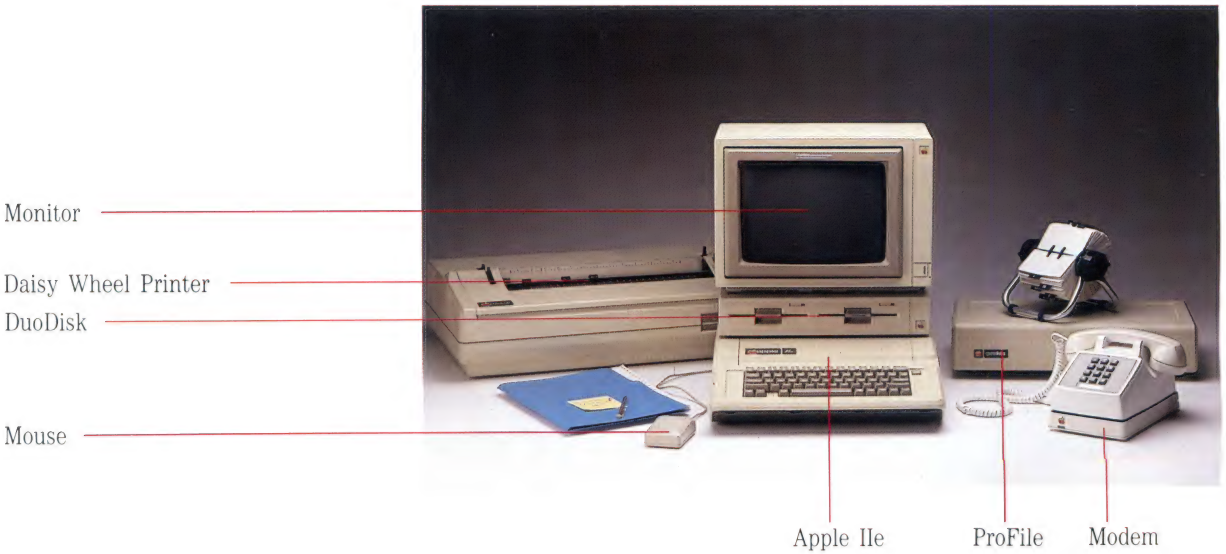
If you plan on doing a lot of charts and graphs for reports and presentations, you might consider an **RGB monitor** instead of, or in addition to, a **monochrome monitor**. An RGB monitor can give you color without sacrificing the resolution you need for word processing and other business applications.

RGB stands for *red green blue*. Many RGB color monitors have better resolution than other types of color monitor.

A daisy wheel printer is a must if you need professional-quality correspondence. If you don't need that level of perfection, you could get by with the faster, more versatile dot matrix printer, which can produce a variety of **type fonts** and graphics.

A modem enables you to tap into information services for stock quotes and business news, and to exchange information with colleagues across the hall or across the country.

Figure 6-3. Typical Business Configuration



Peripheral Devices

This section describes the most popular Apple IIe peripheral devices. But it is not a comprehensive list of the devices available for the Apple IIe. Flip through any computer magazine, and you'll see ads for **music synthesizers** and articles about people who use Apples to control everything from sprinkler systems to coffee makers.

Monitor

There are two general types of monitors: monochrome monitors and color monitors. Monochrome monitors come in three varieties: black and white, black and green, and black and amber. Some studies show that an amber display is easier on the eyes; some studies show that a green

Figure 6-4. Apple RGB Color Monitor

A radio-frequency (RF) modulator makes it possible for a TV set to tune in signals from the computer.

display is easier to read; some people simply prefer black and white because it more closely resembles a typewritten page. The best choice is the one that looks best to you.

Color monitors cost more than monochrome monitors, but they're ideal for computer graphics and for displaying business charts and graphs. Unfortunately, some color monitors aren't very good at displaying text. If you need a color monitor that can double as a text display, ask your Apple dealer about RGB color monitors. RGB monitors have better resolution (a sharper picture) than other types of color monitor.

Using Your Television as a Display Device

It is possible to use a standard television set (with an RF modulator) as a display device for the Apple IIe, but if you plan to use your computer for word processing, financial planning, or other business applications, make sure the program you get is designed for a 40-column display. Some business applications require an 80-column display.

Televisions can't display 80 characters per line clearly, the way monitors can. They can display only 40 characters per line. While 40 characters per line is fine for some applications (games and educational programs), many find it too narrow for business letters or electronic spreadsheets.

Printer

A printer creates a paper copy of information you create with your computer. You can use a computer without a printer, but it's not convenient or practical, for example, to mail your letters on disks. For some people, a printer is a must.

Printers come in a variety of prices and vary accordingly in print speed, quality, and loudness. The most common types of printer are thermal transfer, dot matrix, and daisy wheel.

Thermal Printers

Thermal printers essentially "burn" characters onto paper. They are inexpensive and very quiet. The print quality varies dramatically among different kinds of thermal printers. Some are good enough for correspondence; others are suitable only for drafts and inter-office memos. Most thermal printers require either specially treated paper or specially treated ribbon. Check the prices of these accessories before deciding on what kind of printer to get. Figure 6-5 shows you a print sample produced by the Apple Scribe®, a popular thermal transfer printer.

Dot Matrix Printers

Dot matrix printers form characters with patterns of dots. They're fast, economical, ideal for graphics, and fine for drafts, memos, and personal letters. Because of the way they form characters, dot matrix printers can produce a wide variety of type sizes and typefaces (boldface, italic, and so on)—so you can create headlines and other special effects.

The only drawback to dot matrix printers is that with some dot matrix printers you can see the pattern of dots that make up each character. This can give your documents a look that people associate with computer printouts. If you need a printer that can produce professional, letter-quality documents, you may need a daisy wheel printer. But check the quality of the dot matrix printer before you decide—you may not be able to tell the difference between text produced with a good dot matrix printer and text produced with a daisy wheel printer.

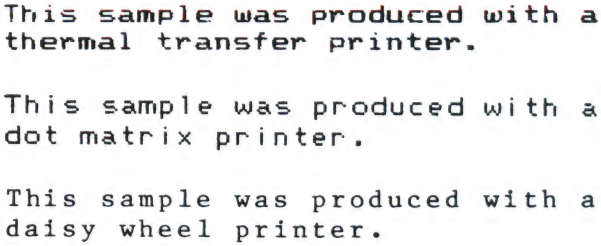
Figure 6-5 shows you a print sample produced by the Apple Imagewriter®, a popular dot matrix printer.

Daisy Wheel Printers

Daisy wheel printers, also known as letter quality printers, are essentially high speed, high quality typewriters. They are slower and more expensive than dot matrix or thermal printers, but if the appearance of your correspondence is important, a daisy wheel printer may be a necessity. Most daisy wheel printers use a circular print wheel (they look something like a daisy) to produce fully formed characters.

Figure 6-5 shows you a print sample produced by the Apple Daisy Wheel Printer.

Figure 6-5. Print Samples


This sample was produced with a thermal transfer printer.
This sample was produced with a dot matrix printer.
This sample was produced with a daisy wheel printer.

Choosing a Printer

Whether you decide on a thermal, dot matrix, or daisy wheel printer, make sure the printer you buy works with an Apple IIe—get a demonstration, preferrably with the programs you'll be using—before you leave the store.

You should also ask your dealer how to attach the printer to your Apple IIe and to help you set the switches on the printer interface card. The switches control things like the speed at which information is sent from the computer to the printer, the way in which information is sent to the printer, and whether the computer, the application program, or the printer generates things like carriage returns.

Don't rely on the printer manual! Printers are designed to work with a wide variety of computers and an even wider variety of application programs, so printer manuals are necessarily vague—ask your dealer for specifics on how to make your printer work with your Apple IIe and the application program you have.

Another consideration in choosing a printer is the type of paper you'll use. Most printers give you a choice of using **pin-feed paper** or single-sheet paper. The advantage of using pin-feed paper, which comes in a stack of attached, perforated sheets, is that you can leave the printer unattended while it prints 20, 30, and 40-page documents. The advantage of using single-sheet paper is that you can print on company letterhead, personal stationery, or anything else.

Serial or Parallel Interface

When you're shopping for printers, you'll hear the phrases **serial interface** and **parallel interface**. These terms refer to the way information is sent from the computer to the printer. With serial printers, the computer sends information one bit at a time. With parallel printers, the computer sends information eight bits at a time.

You'd think that sending information eight bits at a time would be eight times faster than sending information one bit at a time, but either mode of transmission is faster than most printers can print, so speed shouldn't be a consideration in whether you get a serial or a parallel printer. Decide on the printer you want, then get the appropriate interface card to connect it to your Apple IIe. If you get a serial printer, get a serial interface card. If you get a parallel printer, get a parallel interface card. (Don't assume that the interface card comes with the printer.)

Apple Devices are Serial: All of the Apple devices discussed in this section are serial devices.

Plotter

Plotters can reproduce graphs, charts, floor plans, and other graphics you create with your computer.

For students, a plotter can reproduce drawings and geometric designs created with the programming language Logo. See Figure 6-6. For businessmen, a plotter can reproduce graphs and charts created with business graphics software for use in reports and presentations. For engineers and architects, a plotter can reproduce the three-dimensional drawings created with **CAD (computer-aided design)** software for designing cars, circuit boards, buildings, and any other kind of product.

Figure 6-6. Art Produced by a Plotter

Disk Drives

Figure 6-7. DuoDisk

You must have at least one disk drive to use your computer for anything but simple BASIC programming. And it's convenient to have a second disk drive so that you can keep your application program disk in drive 1 and your data disk in drive 2. (A few programs require you to have two disk drives.) If you have an Apple DuoDisk attached to your Apple IIe, you have two disk drives in one case. The drive on the left is drive 1; the drive on the right is drive 2.

Having two disk drives also makes it easier to make copies of data disks—a must, since disks are perishable. Figure 6-7 shows you the Apple DuoDisk.

You can attach up to six disk drives to your Apple IIe (but four is the maximum recommended). The more disk drives you have, the more information is accessible to the computer. (When information is accessible to the computer it's said to be on-line.) But if you need to work with a lot of information at one time, you should consider getting a mass storage device, like the Apple ProFile.

Tape Storage: Before disk drives were available for the Apple II, programs had to be loaded from and saved onto cassette tape using a standard tape recorder. It's slow and complicated, compared to saving and loading from disks, but it's still possible to use cassette tape for storage. (You'll notice that there are input and output jacks with cassette **icons** on the back panel of your Apple IIe.) If you want to use tape for storage, ask your dealer for details or read the relevant sections in the *Apple IIe Reference Manual*.

Figure 6-8. Apple ProFile

ProFile

If you plan to use your Apple IIe for data base applications or other applications that involve large amounts of data, you might want to invest in a mass storage device like the Apple **ProFile**. The ProFile can store the equivalent of dozens of floppy disks. It's a fast and convenient way to get at your data. The ProFile stores all of your data on a pair of **hard disks** sealed inside a box that sits neatly on top of your computer.

In addition to storing your data on a ProFile, you can get a **program manager**, like *Catalyst*™ from Quark, that lets you store your application programs on the ProFile and access them from a menu. Once your application programs are on the ProFile, you can switch from program to program by selecting from the program manager's menu rather than by swapping program disks and restarting the computer.

Mouse

The mouse is a tool for communicating with the computer. When you move the mouse across your desktop, a **pointer** moves in a corresponding direction across the screen. You can use the mouse to move chunks of text from one place in a document to another, to select from lists, and to create charts and other graphics. See Figure 6-9.

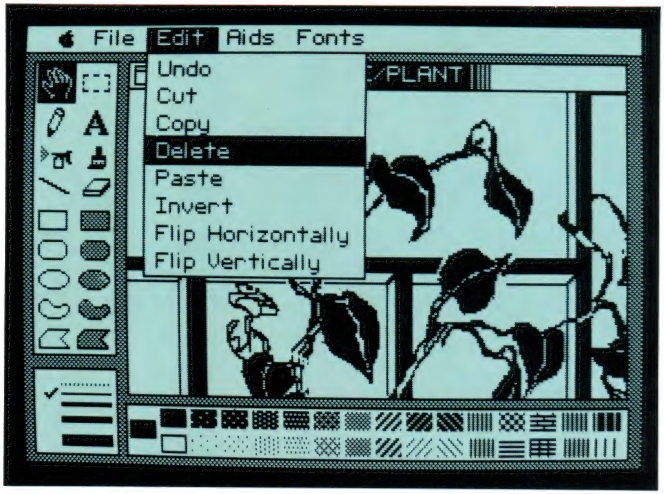
Figure 6-9. Apple Mouse

Before the mouse came along, the main way to communicate with a computer program was by typing commands at the keyboard. The mouse lets you communicate with programs in a more intuitive way, so **mouse-driven** programs tend to be quicker to master and easier to use.

Here are some terms, techniques, and characteristics of mouse-driven programs:

- **Clicking:** Pressing the **button** on top of the mouse is called *clicking*. Many programs let you select from a list of options by moving the pointer to an option and clicking on it.
- **Dragging:** You can move paragraphs or drawings by pointing to what you want to move and holding the mouse button down while you move the pointer to the new location. This is called *dragging*.
- **Pull-down Menus:** Programs that use the mouse generally have a menu bar that stretches across the top of the display. Hidden inside that bar are menu items (lists of options). To see what your options are, you point to one of the menu titles on the menu bar and hold down the mouse button. This reveals a *pull-down menu*. (See Figure 6-10) Point to the option you want and release the button.

Figure 6-10. Pull-down Menu



Anything else you need to know about using the mouse will be explained in the manual supplied with the application program. Keep in mind that not all programs use the mouse.

Figure 6-11. Apple Modem

Modem

A **modem**, short for *MOdulator/DEModulator,* links your computer by telephone to other computers and information services. If you plan to tap into your company's mainframe computer, access a large computer library for stock quotes, medical, or legal research, or use your computer for electronic banking, you'll need a modem and a communications program like *Apple Access II.*

Different modems send and receive information at different speeds. The speed is measured in **bits per second (bps)**, often referred to as **baud.** One common baud rate is 300. You can also get modems for your Apple IIe that send and receive data at 1200 baud. 1200 baud modems

Figure 6-12. Apple Numeric Keypad

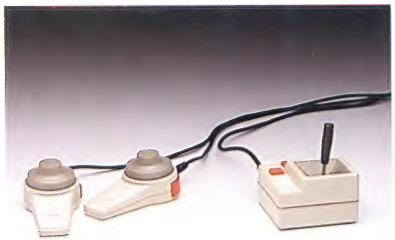
cost more, but they're four times faster than 300 baud modems—a valid consideration because you're often paying long distance phone rates. Figure 6-11 shows the Apple 1200 baud modem.

Keypad

If you're used to working with an adding machine or calculator and will be spending a lot of time entering numeric data, you might want to add a **numeric keypad** to your computer system.

The number keys on the numeric keypad generate the same characters as their counterparts on the top row of the Apple IIe keyboard, but most adding-machine touch-typists prefer using the keys on the keypad to using the spread-out keys on the keyboard.

Figure 6-13. Hand Controls and a Joystick

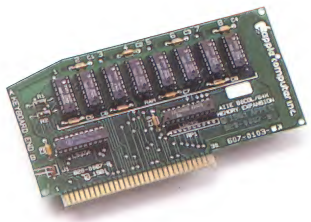


Joystick or Hand Controls

If you plan to use your computer for games—and who doesn't occasionally—you'll want to invest in a joystick or **hand controls**. Not all games require a joystick or hand controls, but the majority do.

Hand controls and joysticks control the movement of creatures or objects in game programs. With hand controls, you control movement by turning a pair of knobs—one in each hand. With a joystick, you maneuver an airplane-style joystick. Both hand controls and joysticks have buttons you press to fire torpedos, throw forward passes, or anything else the programmer can dream up. Figure 6-13 shows you what the hand controls and joystick look like.

Figure 6-14. Extended 80-Column Card



Adding Memory

In an industry as dynamic as the personal computer industry, it's inevitable that computers will be built with more and more memory. It's equally inevitable that newer, faster, more powerful software will be written to take advantage of that extra memory. Where does that leave you?

It leaves you in great shape, because the Apple IIe is designed to grow as technology grows. You can add memory to your Apple IIe right now by adding an extended 80-column card.

Adding a Co-processor

A co-processor is a microprocessor that works with or overrides the microprocessor that comes with your machine. The main reason you'd get one is to take advantage of software developed for other computers—software that wouldn't otherwise work on your Apple IIe.

The most popular co-processor for the Apple IIe is the Z80 processor, which lets you run programs based on the CP/M® operating system.

By plugging a Z80 card into your Apple IIe, you can select from over 20,000 CP/M-based programs, many of them free (public domain) programs.

Ask your dealer for information on other co-processors that let you take advantage of MS-DOS-based programs, and co-processor cards that increase the speed or enhance the graphics of Apple IIe programs.

Other Peripherals

One of the secrets of the Apple II's success is its open architecture. There's hardly any limit to the number and variety of gadgets that you can attach to the Apple IIe to make it a more powerful, productive, or playful machine.

Here's a small sample of the more exotic peripherals that you could add to your computer system:

- Clock Card: Makes it possible for programs, for example, to record the date and time a given file was last revised. With a clock card and home control devices, you can program your Apple IIe to turn lights and kitchen appliances on and off. With a clock card and communications software, you can communicate with an information service at times you specify to take advantage of cheaper telephone rates.
- Accelerator Card: Makes most programs run almost four times faster than normal. It's especially useful for spreadsheet and other number-crunching applications.
- Print Buffer Card: Lets your Apple IIe send an entire file to your printer at one time so you can use your computer for other things while the file is being printed. The buffer card plugs into your printer interface card.

- **Voice Input Device:** Lets you communicate with certain programs by using verbal commands rather than typed commands. Like the mouse, it's an intuitive way to communicate with computer programs.
- **Synthesizer:** A peripheral device that can simulate a variety of musical instruments ranging from woodwinds to percussion. Using special software, you can compose and orchestrate your own music.
- **Home Control Devices:** Peripheral devices that can work with your Apple IIe to control the temperature of your home; turn your lamps, sprinklers, coffee maker, and other appliances on and off; and monitor your smoke and burgler alarms.
- **RAM Card:** Lets you expand the memory capacity of your Apple IIe far beyond 128K to take advantage of even faster, more sophisticated, and more functional application programs.

For more information on these and other peripheral devices for the Apple IIe, read the ads and hardware reviews in computer magazines. If you can't find what you're looking for there, look through the Apple software directories at your local bookstore—many of them have a chapter on peripheral devices for the Apple IIe.

Chapter 6 Summary

Popular Peripheral Devices

Monitor	Displays instructions from the program to you, and shows you what you've typed into memory.
Printer	Produces a paper copy of information you create with the computer.
Plotter	Draws a paper copy of the graphics you create with the computer.
Disk Drive	Writes information on disks and reads information from disks.

Modem	Links your computer to other computers and information services by phone.
Mouse	Lets you create graphics, select from lists, move chunks of data and otherwise communicate with the computer without using the keyboard.
Keypad	Duplicates the number keys on the keyboard in an adding machine layout.
Joystick and Hand Controls	Move objects and creatures around the screen.
ProFile	Stores the equivalent of dozens of floppy disks.
80-Column Text Card	Gives you an 80-character-per-line display instead of the standard 40-character-per-line display.
Memory Card	Adds additional RAM to your Apple IIe.

Conclusion

This manual was designed to get you started—to give you an idea of how your computer works, and how you can put the computer to work in your classroom, home, or office. Where you go from here is up to you.

You may want to learn to use your computer for budgeting or home banking. You may want to learn more about the computer by writing programs of your own. One thing's for sure, your learning won't end with this manual because there is no limit to what you can do with your Apple IIe.

It's impossible to tell you everything there is to know about using the Apple IIe because computers are chameleons. How they work is colored by the program you're using, just as the sound that comes out of your stereo speakers depends on the record you put on the turntable.

So don't expect to learn everything about operating the Apple IIe at one sitting. Learn what you need to use a given application, and appreciate the incredible flexibility of a machine that can be a typewriter one minute and a flight simulator the next.

Computer Confidence

The secret to a good relationship with your computer is confidence. If you live in constant fear of pressing the wrong key and losing data, you'll have a hard time divorcing yourself from pencil and paper.

And the secret to computer confidence is **file management**—knowing how to get at your data, knowing how to make copies of your data. If the application programs you use don't have data management utilities like catalog, copy, and format, you must get a utilities disk that works with your application program and learn to use it.

You'll find ProDOS utilities—like format, copy, and catalog—on the *ProDOS User's Disk* packed with Apple disk drives. If you don't have an Apple disk drive, ask your Apple dealer to help you select the utilities disk that is right for your application programs.

So Long

As you build your software library and add peripheral devices to your computer system, you'll occasionally hit stumbling blocks. Where can you turn? This book is a good place to start. If you can't find the answer here, talk to your dealer. He's the best source of information on the Apple II family of computers. And don't stop there—let us know what the question or problem was by filling out the Tell Apple Card at the back of this manual.

From here on out, the best teacher is experience. You won't really know what you know, or what you don't know, until you start using an application program. Your most unforgettable lessons will come from trial and error. Whatever you do, don't be afraid to experiment.

Enjoy your computer.

Appendix A

Apple II Family Differences

There are thousands of programs for the Apple II family of computers. You can use most of them on your Apple IIe if you take into account

Table A-1. Apple II System Differences

	Memory	Keyboard	Micro-processor	Peripheral Device Interface	
Apple II Plus	48K Expandable to 64K with language card in slot 0.	51 Keys Uppercase Only.	6502	8 Slots (For peripheral device interface cards.)	Recommended Slots Slot 0 Language Card Slot 1 Printer Slot 2 Modem Slot 3 80-Column Slot 4 Other Device Slot 5 Other Device Slot 6 Disk Drive Slot 7 Co-processor
Apple IIe	64K Expandable to 128K and beyond with memory card.	63 Keys Uppercase and Lowercase.	6502A (Early Model) 65C02 (Late Model)	8 Slots (For peripheral device interface cards.)	Recommended Slots Slot 1 Printer Slot 2 Modem Slot 3 Leave empty if you have a card in Aux. Connector. Slot 4 Mouse Slot 5 ProFile Slot 6 Disk Drive Slot 7 Co-processor Aux. Conn. Extended 80-Column Card
Apple IIc	128K Not expandable.	63 Keys Uppercase and Lowercase. Dvorak Option.	65C02	6 Ports (Interfaces for most popular peripherals are built into computer.)	Icons Ports Joystick/Mouse/Hand Controls Modem RF Modulator (for TV) Monitor External Disk Drive Serial Printer

the differences between the Apple IIe and the rest of the Apple II family. These differences are summarized in Table A-1.

Hardware Differences				Languages in ROM	Operating Systems
120 Chips	Open System (Can accommodate a wide range of devices and co-processors.)	V-shaped Openings (Accommodate a variety of cable clamps.)	Additional Features ■ Tape Recorder I/O ■ Slots for Peripherals ■ Built-in Speaker	Applesoft BASIC	DOS 3.2 DOS 3.3 ProDOS CP/M (with Card) Pascal
31 Chips Fewer chips means greater reliability, cooler system, supports MouseText.	Open System (Can accommodate a wide range of devices and co-processors.)	Rectangular Openings (Sized for standard DB-style connectors.)	Additional Features ■ Tape Recorder I/O ■ Slots for Peripherals ■ Built-in Speaker	Applesoft BASIC	DOS 3.3 ProDOS CP/M (with Card) Pascal MS-DOS (with Card)
38 Chips Fewer chips means greater reliability, cooler system, supports MouseText.	Closed System (Can accommodate serial devices and standard peripherals.)	Ports (For connecting peripheral cables.)	Additional Features ■ Built-in Disk Drive ■ 80/40-Column Switch ■ Language Switch (for Dvorak) ■ Volume Controls	Applesoft BASIC	DOS 3.3 ProDOS Pascal

That gives you an idea of how the three machines in the Apple II family differ from each other in terms of hardware. Here's how those hardware differences affect software.

Running Apple II Plus Programs on an Apple IIe

Here are some of the idiosyncracies involved in running a program designed for the Apple II Plus on an Apple IIe.

- Programs designed for the Apple II Plus don't recognize lowercase characters. Press down (CAPS LOCK) and the program should run just fine.
- The Apple II Plus didn't have (DELETE), so programs designed for the Apple II Plus won't respond when you press (DELETE). The program will tell you some other way of deleting characters.
- The Apple II Plus didn't have (↑) or (↓), so programs designed for the Apple II Plus won't move the cursor up or down when you press these keys. The program will tell you some other way of moving the cursor up and down.

Running Apple IIc Programs on an Apple IIe

Here are some of the idiosyncracies involved in running a program designed for the Apple IIc on an Apple IIe.

- Apple IIc programs may refer to your built-in disk drive. To you that means drive 1.
- Apple IIc programs may refer to the printer port, the mouse port, or the communication port. The printer port is comparable to a printer card in slot 1. The mouse port is comparable to a mouse card in slot 4. The communication port is equivalent to a communication card in slot 2.

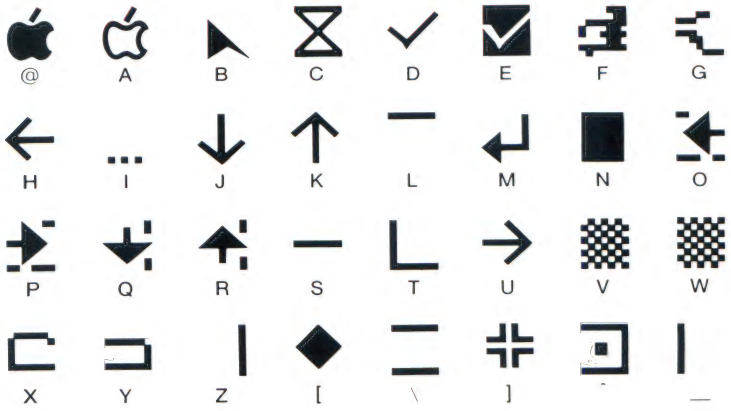
- Apple IIc programs may refer to an 80/40 switch. You can get an 80-column display by adding an 80-column card to the AUX. CONNECTOR slot.
- Some programs designed for the Apple IIc may require 128K. The Apple IIe comes with 64K, but you can run such programs by adding an extended 80-column card to the AUX. CONNECTOR slot inside your Apple IIe.

Running Older Apple IIe Programs on Your Apple IIe

The Apple IIe has been enhanced so that you can take advantage of software developed for the Apple IIc—software that runs faster and has better graphics than was possible on earlier models of the Apple IIe. The enhancement, which involves four chips on the main circuit board, does not in itself give you improved graphics and speed. You must use software that takes advantage of the enhanced features.

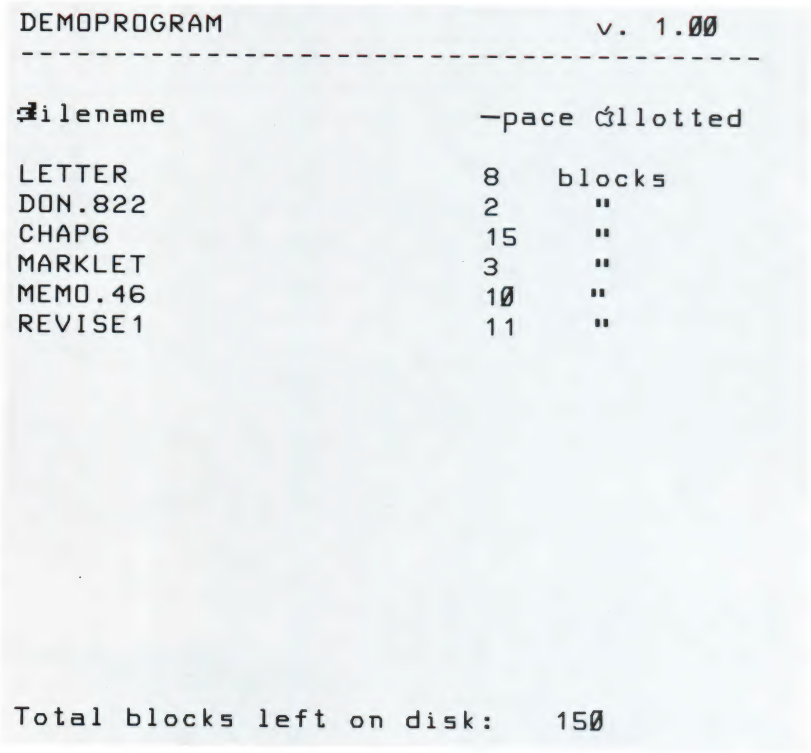
One of the enhancements makes it possible for programmers to use special symbols like those shown in Figure A-1 that make using programs more intuitive and fun.

Figure A-1. Special Characters



Programs designed for earlier models of the Apple II won't take advantage of these special characters—at least not intentionally. But you may notice little apples and check marks in place of uppercase **inverse** characters in older programs. See Figure A-2.

Figure A-2. Special Characters in Place of Uppercase Inverse Characters



Here's why: the original **character generator ROM** (the program in ROM that generates the characters that appear on your screen) had two identical sets of uppercase inverse characters, one of which was unnecessary. In the new character generator ROM, the redundant set of uppercase inverse characters has been replaced with **MouseText characters**, the symbols shown in Figure A-1. Older Apple IIe programs that used the redundant set of uppercase inverse characters now display MouseText characters in their place.

This doesn't have any effect on the way the program works, so if it doesn't bother you, go ahead and use the program.

If it does bother you and you would like to get an upgraded version of the program, see your dealer or contact the developer of the program. Most popular Apple IIe programs have been upgraded to take advantage of MouseText.

With a few older Apple IIe programs, you may encounter more serious problems:

- Programs that use reserved memory locations may stop in midstream. (This is mainly a problem with homemade, "hacker" software, since most programs use the standard memory locations.)
- The copy protection schemes of some programs may cause them not to start up. (This problem is mostly confined to game software.)

If you encounter these problems, contact your dealer or the developer of the software to find out if an upgraded version of the software is available.

Appendix B

Troubleshooting

Making mistakes is part of the learning process. In fact, if you don't make a few mistakes, you're not being very adventurous, and you're typing too cautiously. This appendix is designed to help you recover from mistakes.

General Troubleshooting Tips

Some programs are better than others at shielding you from disaster. And some programs are friendlier than others when it comes to error messages. Friendly programs will tell you what you did wrong and how to fix it. Unfriendly programs will beep and display a cryptic message. If you run into an unfriendly program that doesn't tell you what to do about your mistake, try these remedies:

- Check your typing. (The computer is very literal. If you type **RIN** instead of **RUN**, it won't. If you type a lowercase **l** instead of a **1**, it won't know what you're talking about.)
- Press (CAPS LOCK) down. (Programs designed for earlier models of the Apple II accept entries only in uppercase.)
- Check the manual to see if you did the procedure correctly.
- Get help from someone who knows how to use the program.
- Get help from your dealer. (But keep in mind that the dealer carries a library of software and won't be intimately acquainted with every feature of each program.)

Symptoms and Remedies

If those general troubleshooting tips don't help, here's a list of specific symptoms, probable causes, and suggestions for recovering from a variety of disasters. The disasters are grouped under the following nine categories.

- Problems starting up a program
- Problems with the disk drive
- Problems with the printer
- Problems with the monitor
- Problems with the modem
- Problems switching from one program to another
- Problems saving data on a disk
- Problems extricating yourself from a program
- Problems decoding an error message

Find the heading that describes the general nature of your problem, then locate the specific description of your problem in the left column. With any luck, the remedy in the right column will get you back on track. Good luck.

Problems Starting Up a Program

Here are some common problems you might run into when starting up a program.

Symptom	Cause	Remedy
Nothing happens when you turn on the power. (Drive 1 doesn't make a sound.)	The power cord isn't plugged into the wall, the power cord isn't plugged into the computer, or the disk drive isn't connected to the computer.	Turn the power off, then make sure the power cord is plugged into a power source and plugged into the computer, then try again. If that's not the problem, make sure the disk drive is connected.
Nothing appears on the screen when you turn on the power (even though the disk light comes on and you hear the usual amount of whirring from the disk drive).	The monitor isn't turned on, the monitor isn't plugged in, or the monitor contrast or brightness isn't adjusted properly. If that's not the problem, a card in slot 3 could be interfering with your display.	Turn on the monitor. Plug in the monitor. Adjust the monitor contrast or brightness knob. If that's not the problem, and you've got a card in slot 3, turn off the power, then try removing the card and starting up the program.
Program disk won't start up—drive 1 keeps whirring.	Program disk is damaged.	Press CONTROL-RESET to stop the disk drive. Contact your dealer and get a replacement.
Program disk won't start up—drive 1 whirs briefly.	Drive 1 needs to be aligned or adjusted.	Have your dealer adjust the disk drive.

Symptom	Cause	Remedy
Program won't start up. All you see is a prompt] and a cursor.	The program on the disk isn't self-starting. (You're most apt to run into this situation if you're using programs written by friends or acquired at a users group meeting.)	For DOS 3.3 disks, type **CATALOG** and press (RETURN). This should produce a list (or catalog) of what's on the disk. You can run any of the programs with the letter *A* in front of them by typing **RUN**, the name of the program, and then pressing (RETURN). You can run some of the programs with the letter *B* in front of them by typing **BRUN**, the name of the program, and then pressing (RETURN). (The letters *A* and *B* refer to the program's file type.) For ProDOS disks, type **CAT** and press (RETURN).
Disk drive makes an even whirring sound when you try to start up or load a program from a particular disk.	The disk is probably formatted by an early version of DOS (DOS 3.2 or earlier).	There is a program on the *DOS 3.3 System Master* disk called **START13** that enables you to load DOS 3.2 programs. If you didn't get a *DOS 3.3 System Master* disk with your disk drive, ask your dealer or a friend to make you a copy of the *System Master* disk, then follow these directions for loading DO3 3.2 programs:

BASICS Disk: DOS 3.2 programs may tell you to "boot the BASICS disk," as a way to load DOS 3.2 programs. The BASICS disk is no longer supplied with DOS because the START13 program is easier to use.

1. Start up your *System Master* disk.
2. Type **RUN START13** and press (RETURN).

   You'll see the message

   ```
   13-SECTOR BOOT UTILITY
   SLOT TO BOOT FROM (DEFAULT=6)?
   ```

3. Remove the *System Master* disk, put the DOS 3.2 disk in drive 1, and press (RETURN) to indicate that your disk controller card is in slot 6, the default slot. (If your controller card is in some other slot, type the slot number before you press (RETURN).)

Problems With the Disk Drive

Here are some common problems you might have with your disk drive.

Symptom	Cause	Remedy
You see the message: `DRIVE TOO FAST`	Your disk drive speed is too fast.	Have the speed of your disk drive adjusted.
You see the message: `DRIVE TOO SLOW`	Your disk drive speed is too slow.	Have the speed of your disk drive adjusted.
The disk drive won't stop whirring.	There's no disk in drive 1, or the disk in drive 1 isn't formatted.	Press (CONTROL)-(RESET) to stop the disk drive, then put a program disk in drive 1 and start up again.
The "wrong" disk drive whirs when you start up a program.	The disk drive that whirs when you turn on the power is drive 1.	Stop the whirring disk drive by pressing (CONTROL)-(RESET), then put your program disk in drive 1 and start again.

Problems With the Printer

Here are some common problems you might run into when using a printer.

Symptom	Cause	Remedy
Unintentional double or triple spacing.	Both your printer and your application program are generating **line feeds** after every carriage return.	Turn off the automatic line feed switch on the printer (or change the application program's line feed setting to OFF).
Lines are printing on top of each other.	Neither your printer nor your application program is generating line feeds after carriage returns.	Turn on the automatic line feed switch on your printer.

Problems With the Modem

Here are some common problems you might encounter when using a modem.

Symptom	Cause	Remedy
General garbage appears on the screen.	Your modem is sending or receiving information at a different speed or in a different format from the modem on the other end of the phone line.	Check the information supplied by the information service to be sure you have supplied the correct settings for things like baud rate and number of **data bits**, **stop bits**, **parity bits**.

Problems With the Monitor

Here are some problems you might have with your monitor.

Symptom	Cause	Remedy
Nothing appears on the screen when you turn on the power. (Drive 1 doesn't make a sound.)	The power cord isn't plugged into the wall, the power cord isn't plugged into the computer, or the disk drive isn't connected to the computer.	Turn the power off, then make sure the power cord is plugged into a power source and plugged into the computer, then try again. If that's not the problem, make sure the disk drive is connected.
Nothing appears on the screen when you turn on the power (even though the disk light comes on and you hear the usual amount of whirring from the disk drive).	The monitor isn't turned on, the monitor isn't plugged in, or the monitor contrast or brightness isn't adjusted properly. If that's not the problem, a card in slot 3 could be interfering with your display.	Turn on the monitor. Plug in the monitor. Adjust the monitor contrast or brightness knob. If that's not the problem, and you've got a card in slot 3, turn off the power, then try removing the card and starting up the program.
Letters appear small and blurry when you're using your television as a monitor.	The program you're using is designed for an 80-column display. TV's can display only 40 columns clearly.	If the program gives you a choice, select the 40-column display option. If it doesn't, use a monitor (if available).
Unusual characters (little arrows and check marks) appear on the screen intermingled with regular text.	The application program you're using was designed for earlier models of the Apple IIe and is using a character set now reserved for mouse characters. See appendix A.	Ask your dealer if you can replace your program for an upgraded version.
Screen image is too bright or too dim.	Monitor contrast or brightness isn't set properly.	Adjust the monitor contrast or brightness knob until the display is easy to read.

Problems Switching From One Program to Another

Here are some common problems you might run into when switching from one program to another.

Symptom	Cause	Remedy
Gibberish appears on the screen when you attempt to switch from one program to another by turning the power off then on again.	The first program wasn't entirely erased from memory before the next program was loaded.	Wait 15 seconds before restarting your computer. Better yet, switch from one program to another by pressing (⌘)-(CONTROL)-(RESET).

Problems Saving Data on a Disk

Here are some problems you might have when saving data on a disk.

Symptom	Cause	Remedy
You see the message: DISK WRITE-PROTECTED	The program needs to write something on a disk, but it can't because you've covered the write-enable notch with a write-protect tab, or the disk was write-protected by the manufacturer to keep you from altering it.	If the disk has a write-protect tab, you could remove it, but think twice. You put the tab there to protect the disk. Are you sure you want to remove the protection?
You see the message: DUPLICATE FILE NAME	You tried to use a name you'd already used on that disk.	Give the file a different name and repeat the save procedure.

Problems Extricating Yourself From a Program

Most programs give you an easy way out. If your program doesn't have a Quit option on the menu, try these escape methods (until you find one that works):

- Press (Q) for *Quit*.
- Press (ESC).
- Press (CONTROL)-(C)
- Press (CONTROL)-(C), then press (RETURN).
- Press (CONTROL)-(RESET).
- Press (Ó)-(CONTROL)-(RESET).
- Turn off the power.

Problems Decoding an Error Message

Here are some common error messages you might need to decode.

Symptom	Cause	Remedy
You see the message: **SYNTAX ERROR**	Some programs require all your entries to be in uppercase. You typed something in lowercase. It's also possible that the program doesn't recognize the command or instruction you typed—maybe it's misspelled.	Press (CAPS LOCK) down and type your entry again. Check your typing. If you made a mistake, retype the command.
You see the message: **I/O ERROR**	You put the wrong disk in the disk drive, probably a blank (unformatted) one, or there's a poor connection between your computer and your printer or disk drive. If that's not the problem, your disk drive speed might need adjusting.	Take the disk out of the disk drive and see if it's the one you thought it was. If it's not, replace it and repeat what you were doing when you got the error message. Check to make sure your printer and disk drive are securely plugged into the computer. If that doesn't solve the problem, have your dealer adjust your disk drive speed.

I/O: I/O stands for *input/output*. *Input* refers to information that's traveling into the computer (from the keyboard, for example). *Output* refers to information traveling out of the computer (to a printer, for example). When you get an `I/O ERROR` message, it means there was a problem with the exchange of information between the computer and one of its peripheral devices. You can usually guess what the problem is based on what you were trying to do when the message appeared. If you're trying to print something, the problem is probably the connection between the computer and the printer. If you're trying to load something from or save something to a disk, the problem is with the disk drive.

Other Error Messages

Error messages can come from the operating system, the application program, or the programming language you're using. If the message came from the operating system, it is explained in the manual that came with your operating system. (ProDOS messages, for example, are explained in the *ProDOS User's Manual*.) If the message came from the application program, it should be explained in the manual that came with the program. If the message came from the programming language, it's explained in your programming reference manual.

Follow the instructions in the troubleshooting section of your operating system manual, applications program manual, or programming reference manual.

Appendix C

Apple IIe Specifications

Standard Features

- 64K RAM
- 65C02 Microprocessor
- 16K ROM, including Applesoft BASIC
- Memory expansion slot
- Seven slots for peripheral device interface cards
- Typewriter-style keyboard, with access to all 128 ASCII characters
- Speaker
- Hand control input and output
- Cassette recorder input and output
- Color graphics capability

Programming Languages Available

- BASIC
- Pascal
- Logo
- 6502/65C02 Machine Language
- COBOL
- FORTRAN
- SuperPILOT
- FORTH
- C
- PL/1
- LISP
- Modula-2

Operating Systems

- ProDOS
- DOS 3.3
- DO3 3.2 (using the START13 program on the *DOS 3.3 System Master* disk)

DOS 3.2: You can use DOS 3.2-based programs on your Apple IIe, but you first have to load the START13 program from the *DOS 3.3 System Master* disk.

- Pascal
- CP/M (With a Z80 card)
- MS-DOS (With a co-processor card)

Popular Peripherals

- Printer—thermal, dot matrix, letter quality
- Color plotter
- Modem—300 baud, 1200 baud
- Monitor—monochrome, RGB color
- Disk drive
- ProFile
- Mouse
- Hand controls, joystick
- Numeric keypad
- 80-column card with 64K memory expansion
- 80-column card with 64K memory expansion and RGB video

Appendix D

Guide to Service and Support

To help you maximize the performance you'll get from your system, Apple Computer, Inc. has established a worldwide network of full-support dealers. Your local dealer has a complete package of services to offer you. Each has an Authorized Service Center with specially trained technicians. The center is equipped with the latest diagnostic programs and an inventory of replacement parts so you'll get fast and efficient service.

If you need answers to technical questions or information about product updates, your full-support dealer can help you. Apple's Technical Support organization backs each dealership to assure prompt, reliable assistance.

Service

If service is required, you should take the system (or Apple product) to your dealer. If you have moved, take it to the nearest Authorized Service Center.

There are more than 2100 Authorized Service Centers throughout the world. For the location nearest you, call (800) 538-9696 in the United States or write

Apple Computer, Inc.
Attn: Customer Relations
20525 Mariani Avenue
Cupertino, CA 95014

During the initial warranty period, your dealer will repair or replace, at no charge, any Apple-manufactured product that proves to be defective. Apple also offers the AppleCare Carry-In Service Agreement, which will keep this same protection in force for an additional year. This coverage is available through your full-support dealer. (See the "AppleCare" section in this Appendix for information.)

Support

Become thoroughly familiar with your manuals; then, if you still have questions, call on your dealer for assistance.

If you have a question that your dealer is unable to answer, ask him to refer the question to Apple Technical Support. Apple Technical Support provides your dealer with *Technical Notes*, answering commonly asked questions, and access to technical support specialists.

Your dealer has the latest information on new hardware and software products, and will keep you informed about any product updates. If you want to upgrade your system, your dealer can help you select compatible components.

For service and support, look to your full-support dealer!

AppleCare

When you first purchase your Apple computer, you are protected by a 90-day warranty. So you don't pay for parts or labor if a repair is needed; there are no unanticipated service expenses. You can add one full year to this protection with our fixed-cost, carry-in service plan—AppleCare.[SM] It combines convenient service with fast turn-around.

AppleCare Carry-In Service is the lowest-priced service package in the industry. And your AppleCare agreement will be honored at all Apple Authorized Service Centers within the country of purchase—added insurance should you relocate. Local service means time saved in getting your Apple back to work. Ask your Apple dealer for details.

You may purchase AppleCare at any time. But for uninterrupted protection, it's a good idea to buy it along with your system. Besides providing you with the most complete coverage, purchase with your system avoids an owner-paid dealer inspection of your system if your 90-day warranty has expired.

AppleCare is available through your Apple dealer. Protect your Apple—ask for AppleCare.

Appendix E

Ask Apple

Now that you've spent some time with the Apple IIe, you probably have lots of questions that never occurred to you before you actually tried out a computer. In this section, the questions new Apple users frequently ask are answered. If you have other questions, ask your dealer, people at an Apple users group, or send your inquiry to one of the Apple magazines.

Can I run software for other computers on the Apple IIe?

The software that runs on the Apple IIe is software that uses one of Apple's operating systems: ProDOS, DOS, or Pascal. Software written for other computers doesn't use these operating systems and consequently won't work on the Apple unless you install a co-processor card. (See Chapter 6.) You will find, however, that almost all major software publishers have versions of software that run on the Apple IIe.

Sometimes I hear horror stories about people typing pages and pages of information and then having it disappear. How can I prevent this from happening to me?

Save! Save! Save! Every program has a way for you to transfer information from the computer's memory to a file on a disk. Once stored on a disk, information is safe, or at least a lot safer than it is when it's only in your computer's memory. That's because information stays in memory only as long as the power is on and the computer is working properly. Power surges, electrical failures, computer failures, and klutzy friends who trip over power cords are rare, but they invariably happen just after you've written your cleverest program or most heartfelt letter. By saving frequently to a disk (at least every 10 minutes) you're guaranteed that, no matter what, you won't lose too much valuable information. But saving to a disk is only half the secret. At the end of the day, always make a backup copy of your disk. No matter how careful you are, disks get damaged. The only way to guard against a damaged disk is to have a spare copy.

Can software break?

Yes, sometimes software just doesn't work the way it's supposed to. But then again, sometimes hardware doesn't work the way it's supposed to, and still other times, users don't work the way they're supposed to. What this means is that, although software may appear broken, the problem often is with hardware or, believe it or not, the user. If you think your software is broken, try reading the manual. It's possible that the software is meant to work the way it's working. If, after reading the manual, you still think the software is not working correctly, do a repeat test: note the error and then follow the same sequence of steps to see if you can get the error to happen again. Assuming it does, your next task is to figure out whether the problem's with a piece of hardware, such as the computer or disk drive, or with the software. Try running other programs on your computer. If they also don't work properly, chances are that hardware is the problem. If you try running the broken software on your dealer's computer and have the same problem, you probably have a real software bug on your hands. Once you've caught a bug, report it to your dealer. He may have a patch (a corrected piece of software), or he may be able to help you work around the problem. If your dealer can't help, contact the software publisher directly; many have toll-free telephone numbers.

How much do I need to know about operating systems?

Unless you're planning on some heavy-duty programming, using a general utilities disk is the closest you need to get to an operating system. If, on the other hand, you've decided that programming is for you, you'll probably need more in-depth knowledge. If you'll be doing BASIC programming, read *BASIC Programming With ProDOS* and the *ProDOS Technical Reference Manual.* Some BASIC programmers may want to write programs using DOS, the operating system Apple used before ProDOS. If you want to write DOS programs, you'll need to purchase the *DOS User's Kit.* Finally, if you want to write Pascal programs, you'll need the Pascal operating system and the accompanying manual. Logo uses the ProDOS operating system; the Logo manuals explain how to use ProDOS with Logo.

What does ProDOS do that DOS doesn't do?

ProDOS directly supports all Apple disk storage devices, including the ProFile, Apple's large-capacity storage device. ProDOS increases the accessibility of disk storage because of extra commands, and disk read and write functions are faster under ProDOS.

What's booting?

In computer lingo, *booting* means starting up your computer. When you turn on the power, a built-in program (the Monitor program) is put into memory, where it turns on the disk drive. The disk drive then transfers the startup program on the disk to the computer's memory. All this must happen before the computer is ready to work. So, quite literally, booting is letting the computer pull itself up by its own bootstraps, which is how the term originated.

Is my Apple very fragile? I keep thinking I'm going to break it.

Your Apple is about as fragile as your television set or stereo. You will never break your Apple by pressing the wrong keys, just as you won't break your TV by turning to the wrong channel.

Are disks fragile?

Yes, believe it or not, disks are a lot more susceptible to damage than your computer. In fact, damaged disks are probably the greatest cause of what people think is a broken computer or broken software. Dust is a disk's greatest enemy. To guard against it, always keep disks in their envelopes. Also, keep disks away from extreme heat, sunlight, liquids, and anything that contains a magnet, like a telephone. It's best to store disks in a disk holder. (If you don't have a special disk holder, a shoe box works fine.) Finally, when preparing disk labels, write them first, then stick them on the disk. If you must write on a label that's already on a disk, make sure you use a felt-tip pen, rather than a ball-point pen. Using a pencil or ball-point pen could dent the surface of the disk.

Is it OK to use both sides of a disk?

Not usually. The disk that came with this manual is specially made for two-sided use.

Do I need two disk drives?

No, you can use almost all software with one disk drive. A second disk drive just makes using your computer a little easier. The time when a second drive comes in most handy is when you're making backup copies of disks. If you copy a disk using only one disk drive, you have to do a lot of swapping—that is, swapping your original and backup disks in and out of your disk drive. If you have a second disk drive, you can put your original disk in one drive, your backup in the other, press a few keys, and then let your computer do the work.

How much electricity does my Apple use?

Your Apple IIe system, complete with monitor, uses less electricity than a 100-watt light bulb.

Should I turn off my Apple after using it?

If you're going to be away for more than an hour or two, it's a good idea to turn off your computer, just so you don't waste electricity. If you're just taking a stretch or grabbing a drink, leave your Apple on (but save what you're working on before you get up).

Do I need a power surge protector to make sure my computer doesn't blow up?

First of all, computer blow-ups and smoke-outs are things of the past. Today, about the most dramatic result of a power surge or electrical storm is lost data. Even losing data is extremely rare, however, since your computer has a built-in mechanism to guard against changes in electrical power. The only people who may want to invest in a protector are those who are extremely cautious and those who live in areas that are particularly prone to electrical storms, hurricanes, and electrical failures.

Do I need to touch type to use a computer?

No, you don't need to know how to touch type. Lots of people who use the hunt-and-peck method (that is, they hunt for each key as they need it) do just fine. In fact, hunt-and-peckers report greatly increased typing speeds after a few days with a computer. If you want to learn to touch type, you may want to buy a typing program. These programs give you typing instructions right on the screen.

What's K and how much do I need?

To understand what a K or kilobyte is, you first need to know what a byte is. A byte is the space one letter or digit takes up in the computer's memory. A kilobyte is equal to 1024 bytes. That means that a computer with 64K, like the Apple IIe, can store a little more than 64,000 characters in its memory. The more kilobytes your computer has, the more information it can store and the larger the programs it can run. 64K is enough memory for most home and business applications.

Is it bad for your eyes to look at the screen for too long?

We don't know of any studies that have found that staring at a monitor is harmful to your eyes. Some people do, however, report getting headaches or eye strain after lengthy tête-à-têtes with their computer. Current thinking is that these symptoms are caused by sitting in the same position for long periods rather than from the way information is displayed. In any event, it's a good idea to get up and stretch, just to give your eyes a rest and your body a chance to get moving.

How do I use (get to) the extra memory in my Apple IIe that I get by adding an extended memory card?

You don't have to do anything. Software programs that need 128K use the memory automatically.

How can I get in touch with an Apple users group? What are the meetings like?

Send a self-addressed, stamped envelope to:

International Apple Core
908 George Street
Dept. UG
Santa Clara, CA 95050

They will send you a list of users groups in your state.

Meetings are informal gatherings of Apple owners like yourself. At a meeting, you can expect to get assistance setting up your computer; you can get questions answered. You'll enjoy the social and informational tone of the meetings. If you choose to join the group, you may be asked for a small fee to cover membership.

Is there really a way to get "free" software?

Well, nothing is ever free. But you can get very inexpensive public domain software when you join an Apple users group. The users group may charge a small fee to cover their expenses, or they may ask that you provide a blank, formatted disk so that you can copy public domain software quickly.

Are parts for my Apple IIe computer easy to get?

Apple's service is oriented toward modular repair, rather than supplying parts to customers. Apple computer modules are available to your dealer; please see him if you have a question.

Why doesn't Apple offer a one year warranty for the Apple IIe computer?

Our 90-day warranty is the industry standard that covers faulty materials or workmanship. Apple offers an inexpensive repair insurance called *AppleCare*. Please ask your Apple authorized dealer for details.

Is there a catalog of Apple IIe software and accessories I can order from?

No, we don't sell products directly to customers. Your dealer has up-to-date information about Apple's newest products and will be glad to help you make choices based on his knowledge of your needs. You may also want to look at any one of a number of independently published software catalogs, which are often available through your dealer, local library, or bookstore.

How do I clean my disk drive?

We don't recommend that you try to clean your drive. Floppy disk jackets lubricate the disks as you use them. If you have problems with your disk drive, see your Apple dealer. He can clean it or repair it for you.

I got my Apple IIe before I moved. Will dealers in my new neighborhood honor the warranty and help me with questions?

Any Apple authorized dealer is happy to honor your warranty and is trained to answer questions about Apple products.

Can I take my Apple IIe overseas as it is?

No. You need to buy a heavy-duty, step-down transformer from your dealer so that your computer system will handle European differences. Here's the formula for deciding which voltage transformer you'll need. Look on the back of *each piece of equipment* in your computer system and find the voltage requirement. Now add those numbers together. Then buy a transformer that meets your total system requirements. A typical Apple IIe system requires a 100-watt transformer. Also be sure to purchase a monitor for your computer in the United States, because European monitors are different and may not work as well with your system as one you buy state-side. Again, consult your dealer about overseas requirements.

How did Apple get its name?

The name *Apple Computer* was chosen late one afternoon as Steve Jobs and Steve Wozniak, Apple's founders, faced the deadline for filing a Fictitious Name Statement, part of the business licensing procedures. After volleying names back and forth with Wozniak for hours, Jobs looked at the apple he was eating and decided that, unless he or Woz arrived at something better by five o'clock, they would call the company Apple. Five o'clock came and went; Apple was the new company's name.

Is there such a thing as the Apple I?

Yes. The Apple I was the first computer that Steve Jobs and Steve Wozniak created. The computer had no case, and you had to purchase your own keyboard. There were no disk drives back then, so all programs had to be stored on cassette tape. Really, though, the Apple I was the most user friendly computer of its day since it required only a minimum of time and technical know-how to put it together. About 200 Apple I's were built. The computer was designed at night in a lab at Hewlett-Packard and manufactured in the garage of Steve Jobs' parents. Unless you're a collector, the Apple I isn't much of a bargain; the computer sells for between $10,000 and $15,000.

Did the Apple I have a manual?

You bet. It was about eight pages long.

Who designed the Apple logo?

The Apple logo was designed by Regis McKenna, a Silicon Valley public relations firm. The original Apple logo was a design of Newton under an Apple tree. But Newton didn't lend himself to reproduction, so Regis McKenna was called in to create an insignia that could be replicated more easily.

Should I worry if I find myself talking to my Apple IIe?

No. Lots of people talk to their computers, especially when they're just learning to use them. What's nice about the current crop of computers is that they can't understand what you're saying. In a decade or so, you may have to watch your language.

Glossary

accelerator card: A circuit board you can add to your Apple IIe to make most software run up to four times faster.

accounting software: A type of application program that lets you keep track of accounts payable, accounts receivable, inventory, and so on.

accessory: Another word for **peripheral device**—something you attach to the computer (like a printer or a joystick) to make it a more powerful or playful machine.

address: A location in the computer's memory.

Apple II: A family of computers. The granddaddy of the family, the Apple I, was invented in a garage in California.

Apple IIe Reference Manual: A manual containing detailed descriptions of all the hardware and firmware that make up the Apple IIe. It's designed both for programmers and peripheral-card designers, but not for newcomers to computers.

AppleCare: Apple's fixed-cost, carry-in service plan.

Applesoft BASIC: The Apple II dialect of the BASIC programming language. See **BASIC**.

application program: Software designed for a particular purpose (such as home finance, education, word processing).

arrow keys: The keys in the lower-right corner of the Apple IIe keyboard that control the movement of the cursor in most programs.

ASCII: Acronym for *American Standard Code for Information Interchange*. It's a communications code that defines the representation of letters, numbers, and punctuation marks.

assembly language: A programming language that is very close to the language of electrical impulses that is the Apple IIe's native tongue. Because assembly language programs require very little translation, they can be very fast, and are therefore ideal for arcade-style computer games and other applications in which speed is a factor.

AUX. CONNECTOR: A slot inside the Apple IIe for cards that increase the memory or enhance the video capabilities of the computer.

back panel: The rear panel of the computer case.

backspace: To move the cursor to the left.

baud: A designation for how fast peripheral devices can send and receive information.

BBS: See **bulletin board system**.

BASIC: Short for *Beginners All-purpose Symbolic Instruction Code*. The most popular computer language for personal computers. It's built into your Apple IIe.

binary: A numbering system where every number is expressed as a combination of zeros and ones. It's a numbering system perfectly suited to computers because the computer's brain is made up of switches—like light switches—that can either be on or off. *On* is often represented as the number 1. *Off* is represented as the number 0.

bit: The smallest item of useful information a computer can handle. Usually represented as a one or a zero. Eight bits equals one **byte**.

bits per second: (Abbreviated **bps**.) A designation for how fast peripherals can send and receive information.

bps: See **bits per second**.

boot: Another way to say **start up** your application program.

bug: An error. The expression comes from the early days of computing when a moth flew into a room-size computer and caused a breakdown.

bug-ridden: Full of bugs.

bulletin board system: (Abbreviated **BBS**.) A computerized version of the bulletin boards frequently found in grocery stores and laundromats—places to leave messages, and to advertise things you want to buy or sell. One thing you get from a computerized bulletin board that you can't get from a cork board is free software. See **public domain software**.

business graphics: Programs that let you analyze numerical information in a visual way.

button: The raised area on top of the mouse that you press when you want to select from a menu or perform other activities in mouse-based programs.

byte: A sequence of eight bits that represent an instruction, a letter, a number, or a punctuation mark.

C: A programming language used with the popular UNIX operating system.

CAD: See **computer-aided design**.

CAI: See **computer-aided instruction**.

CAPS LOCK: A key that you can lock into place so that subsequent letters you type will come out capitalized. CAPS LOCK doesn't affect non-alphabet keys.

card: A circuit board that you can plug into a slot inside the Apple IIe to expand the computer's memory, enhance its video capabilities, or give it the means to communicate with a peripheral device like a printer or a modem.

CAT: A ProDOS command that you can use to examine the contents of a disk. **CAT** is short for **catalog**.

catalog: A list of all the files on a disk. Sometimes called a **directory**.

Catalyst: A program manager produced by Quark.

characters: Letters, numbers, and other symbols used to communicate with a computer.

character generator ROM: The integrated circuit responsible for printing characters on the screen.

chip: A small wafer containing thousands of microscopic components.

circuit board: A collection of integrated circuits (chips) on a board.

click: The act of pressing the mouse button. You click the mouse when you want to select something from a list in a mouse-driven program.

clock card: An interface card that keeps time. A clock card can work with software to control when files are sent to a remote computer, when a given appliance is turned on or off, and it can mark the time and date a file was last revised.

COBOL: An acronym for *Common Business Oriented Language*. A business-oriented programming language especially suited to applications involving large amounts of data.

code: To write a program. Can also refer to the lines of the program.

column: A way of designating the width of the computer's display. A column is one character wide. The standard Apple IIe can display 40 columns of characters. An Apple IIe with an 80-Column Text Card can display 80 columns of characters.

command: A word or character that causes the computer to do something.

communications software: Programs that make it possible to exchange information with other computers.

compiler: A computer program that translates a language, such as Pascal, into a language the computer can understand. A compiler translates the entire program just once. Compare **interpreter.**

computer: A machine that processes words and numbers faster than a food processor can slice potatoes. Not particularly creative or intuitive, but very good at repetitious tasks.

computer-aided design: Software for creating three-dimensional drawings.

computer-aided instruction: Learning something (math, history, home economics, or anything else) with the help of a computer program.

computer system: A collective term for the Apple IIe and everything attached to it.

configuration: See **computer system.**

connect time: The amount of time you spend accessing an information service.

contrast knob: A dial on your video monitor that lets you adjust the brightness on the screen.

CONTROL: A key on the Apple keyboard that when pressed in conjunction with another key makes that other key behave differently. It controls the operation of other keys.

controller card: An interface card that tells your Apple IIe how to work with one or two disk drives.

co-processor: A microprocessor on a card that overrides or works with the microprocessor on the main circuit board.

copy protect: To prevent someone from duplicating the contents of a disk. Compare **write protect.**

courseware: Educational software.

CP/M: An acronym for *Control Program for Microprocessors.* An operating system that works with the Z80 microprocessor.

cursor: A blinking underline, rectangle, or other symbol that marks your place on the screen.

daisy wheel printer: A type of printer that produces professional, letter quality correspondence.

data: Information, especially raw or unprocessed information.

data base: A type of application program that helps you keep track of lists of information. Makes it easy to recall, update, and cross reference information. (Also known as **data management.**)

data bits: The computer sends and receives information as a string of bits. These are called data bits.

data disk: A disk containing your work—letters, budgets, pictures, and so on.

data management: See **data base.**

default: A recommended response to a question in a program. The response will be used by default unless you supply an alternative.

DELETE: A key that you can press (in some programs) to erase the character to the left of the cursor.

destination volume: The disk you're copying to. Compare **source volume.**

device: Short for **peripheral device.** A machine attached to your computer, such as a printer or a modem.

directory: A list of all the files on a disk. Sometimes called a **catalog.**

disk: A circle of flexible plastic coated with iron oxide (the same sort of thing they make cassette tape out of). You can buy programs pre-recorded on disks, and you save your work on blank disks.

disk controller card: A circuit board that provides a connection between the Apple IIe and one or more disk drives.

disk drive: A device that loads information from disks into the memory of the computer and saves information from the memory of the computer onto a disk.

disk drive light: A light that comes on when your disk drive is loading something from or storing something on a disk. When the light is off, it's safe to put disks in and take disks out of the drive. When the light is on, don't open the disk drive door.

disk operating system: Programs that, among other things, control the way information is loaded into memory, the way the computer works with the information, the way information is stored on a disk, and the way the computer talks to printers and other peripheral devices.

display: A general term to describe what you see on your screen when you're using a computer.

DOS: Short for **Disk Operating System**. See **operating system**.

DOS 3.2: An early Apple II operating system. **DOS** stands for **Disk Operating System**; 3.2 is the version number.

DOS 3.3: One of three operating systems used by the Apple IIe. DOS stands for **Disk Operating System**; 3.3 is the version number.

dot matrix printer: A type of printer that forms characters with patterns of dots.

(↓): A key that you can press (in some programs) to make the cursor move down a line.

download: To send a file from one computer to another.

drag: A mouse expression for what you do when you move a block of text or a picture from one place on the display to another. Dragging involves positioning the mouse pointer on the item to be dragged, holding the mouse button down, moving the pointer to the new location, and releasing the button.

drive 1: The disk drive where you put the program disk you want to start up.

educational software: Software that teaches something. Compare **courseware** and **computer-aided instruction**.

80-Column Text Card: A circuit board that doubles the number of characters shown across the screen.

END: An Applesoft BASIC command that marks the conclusion of a program.

envelope: A paper sleeve that protects disks when they're not in use. Compare **jacket**.

error message: The computer's way of alerting you to a failure in the communication process. Often accompanied by a beep.

(ESC): A key you can press (in some programs) to get back to the menu or to cancel a procedure that's in progress.

Extended 80-Column Text Card: A circuit board that doubles the number of characters shown across the screen and doubles the memory of the computer from 64K to 128K.

Extended 80-Column Text/AppleColor Adaptor Card: A circuit board that you can plug into the AUX. CONNECTOR slot to double the number of characters shown across the screen, to double RAM from 64K to 128K, and to allow you to connect an RGB-style color monitor to your Apple IIe.

file: A collection of information that you store on a disk.

file management: A general term for copying files, deleting files, and for other housekeeping chores involving the contents of disks.

filename: The name you give your file before you save it on a disk.

filer: A set of programs that control and manipulate the files on disks.

firmware: Another name for the programs in ROM (**read-only memory**). It's more permanent than the software in RAM (**random-access memory**)—thus the name.

flexible disk: Another name for **floppy disk**. See **disk**.

floppy disk: Disks are called **floppy disks** or **floppies** because they're made of flexible plastic.

format: To divide a disk into sections where information can be stored. Disks must be formatted before you can save information on them. Also called **initializing**.

FORTH: A programming language.

game program: A program designed for entertainment.

graphics: A fancy word for computer pictures.

hacker: A person who is on a first-name basis with RAM, ROM, and the microprocessor. A person who'd rather write application programs than use store-bought programs.

hand controls: Computer accessories that move creatures and objects in game programs.

hard copy: A printed copy of something produced with the computer.

hard disk: A disk that is permanently sealed inside a mass storage device, like the ProFile.

hardware: Those parts of the computer that you can see and touch. The computer and the machines that attach to it: the disk drive, printer, and other peripheral devices. Compare **software**.

HOME: An Applesoft BASIC command that clears the screen but doesn't erase what's in memory.

home control devices: Devices that can control things like the temperature of your home, turn your lamps on and off, and monitor things like smoke and burglar alarms.

home finance program: A program that helps with budgeting, portfolio management, tax planning, and so on. Like a spreadsheet only easier to use.

I/O ERROR: A message you get when there's a problem with the way information is being exchanged with peripheral devices. *I/O* stands for **input/output**. Consult Appendix B for remedies.

icon: A symbol, like the symbol on the back panel of the computer that shows you where to plug in the monitor.

industry specific software: Programs designed for a particular audience—doctors, lawyers, marine biologists.

information service: A large data base that you can subscribe to for news, stock quotes, and other services.

initialize: To prepare a disk so the computer can store information on it. Another word for **format.**

input/output: Abbreviated **I/O.** Refers to the means by which information is sent between the computer and its peripheral devices.

integrated circuit: Networks of microfine wire that conduct electrical impulses. They are etched on silicon wafers and embedded in black plastic.

integrated software: A group of application programs, usually on one disk, designed to share data.

interface: Hardware or software that links the computer to a device.

interface card: See **peripheral card.**

interpreter: A program that translates the English-like terms in a programming language like BASIC into a form the computer can understand. Compare **compiler.**

inverse characters: *Inverse* means *opposite.* If characters ordinarily show up as white characters on a black screen, inverse characters would show up as black characters on a white screen.

jacket: A square of plastic that protects a flexible disk. You don't remove the jacket (and expect to ever use the disk again). Compare **envelope.**

joystick: An accessory that moves creatures and objects in game programs.

K: Short for **kilobyte.** It's how computer memory is measured. The Apple IIe has 64K of RAM (**random-access memory**) expandable to 128K with an Extended 80-Column Text Card, and 16K of ROM (**read-only memory**). One K is equal to 1024 bytes.

keyboard: Your way of communicating with the computer. It looks like the keyboard on a typewriter, but programmers can make the keys do anything they want them to.

keypad: See **numeric keypad.**

kilobyte: A measurement of computer memory. One kilobyte equals 1024 bytes, and it takes one byte to make one character.

label: A strip of paper you stick on a flexible disk to identify it. The label is a good place to put your thumb when you pick up your disks.

(←): A key you can use (in most programs) to move the cursor one character to the left. In some programs, pressing (←) erases characters to the left as the cursor moves to the left.

LET: An Applesoft BASIC command used to define variables.

letter quality printer: See **daisy wheel printer.**

line feed: Act of advancing to the next line.

line number: A number that tells the computer the order in which to carry out the instructions in a BASIC program.

LISP: A programming language.

LIST: An Applesoft BASIC command that lets you see the program in memory.

load: To put data or programs into the computer from a disk.

Logo: A computer language that encourages learning through discovery. Easy and fun to learn, but powerful enough for serious application programming.

machine language: The language of ones and zeros that is the only language the computer understands. All other languages, like BASIC, have to be translated into this binary code before the computer can understand them.

main circuit board: A large **circuit board** that holds RAM, ROM, the microprocessor, custom-integrated circuits, and other components that make the computer a computer.

main memory: See **random access memory**.

mainframe computer: A computer with far greater processing power and memory capacity than a personal computer, but harder to pay for and carry from room to room.

mass storage device: A device, like the Apple ProFile, that can store the equivalent of dozens of floppy disks.

memory: Integrated circuits (chips) that store instructions for the microprocessor (the brain) of the computer. There are two kinds of memory: temporary memory (called RAM), and permanent memory (called ROM). The contents of **random-access memory** disappear when you turn off the power; the contents of **read-only memory** do not.

menu: A list of choices.

microprocessor: The brain of the computer. The Apple IIe has a 65C02, eight-bit microprocessor.

modem: Short for *MOdulator/DEModulator*. A device that links your computer to other computers and information services over telephone lines.

Modula-2: A programming language.

monitor: It looks like a TV, but it doesn't have channels. It displays instructions from the program to you and shows what you've typed into memory.

monochrome monitor: A black and white, amber and black, or green and black monitor.

mouse: A pointing device that makes it easy to draw pictures, select from lists, and move things around the screen.

mouse button: The button on top of the mouse. You press it to select from menus or when you want to move items around on the screen.

mouse-driven: A phrase used to describe a program that lets you use a mouse.

MousePaint: A sketching program from Apple.

MouseText: Special characters, like check marks and little apples, that make programs more fun or more intuitive to use.

MS-DOS: The operating system for programs designed to run on the IBM personal computer.

music synthesizer: A device that can simulate musical instruments and help you create your own compositions.

network: A bunch of computers linked together.

NEW: An Applesoft BASIC command that erases memory so you can start a new program from scratch.

numeric keypad: A device with number keys arranged in an adding machine layout that generate the same characters as their counterparts on the top row of the Apple IIe keyboard.

on-line: On-line means that a device is connected or that data is accessible to the computer.

(Ó): A key that programmers can use to control the way other keys work in a program. Compare (Ô)

open architecture: A computer with an open-lid policy that invites add-on devices.

operating system: A program that, among other things, controls the way information is loaded into memory, the way the computer works with the information, the way information is stored on a disk, and the way the computer talks to printers and other peripheral devices. ProDOS, DOS 3.3, and Pascal are three operating systems available for the Apple IIe.

output: Information traveling out of the computer.

oval cutout: An opening in the disk jacket through which the disk drive read/write head reads from and writes to the disk.

parallel device: A printer or other device that receives data eight bits at a time. Compare **serial.**

parity bits: Bits used to check for errors during data transmission.

Pascal: A programming language taught in high school and college computer science courses because it stresses a systematic approach to problem solving.

password: A secret word that confirms your identity as a subscriber to an information service.

peripheral: Short for peripheral device.

peripheral card: A circuit board you plug into the Apple IIe to link the computer to a peripheral device.

peripheral device: A device that is connected to the computer, like a printer or a modem.

PILOT: A programming language that lets instructors design their own educational software.

pinfeed paper: A stack of attached, perforated sheets designed to feed into a printer without much human intervention.

PL/1: A complex, but flexible programming language said to combine the best features of FORTRAN, a programming language suited to scientific applications, and COBOL, a programming language suited to business applications.

plotter: A device that prints charts and graphs.

pointer: A marker that moves across the screen when you move the mouse across your desk (in mouse-driven programs). Compare **cursor.**

power light: A light that tells you whether or not the Apple IIe is turned on.

power strip: A device that plugs into one three-hole, grounded outlet, but which can accommodate four or six three-pronged plugs. A must if you have more than two devices that need to be plugged into a grounded, three-hole outlet.

power supply: A box that draws electrical power out of the power outlet and converts it to power the computer can use to do its computing.

power switch: A rocker switch on the back of the computer that you turn on when you want to use your computer.

print buffer card: A card that plugs into a printer interface card that lets your Apple IIe send an entire file to the printer at one time so you can use your computer for other things while the file is being printed.

printer: A device that produces a paper copy of the information you create using the computer.

ProDOS: Short for **Professional Disk Operating System**. The primary operating system for the Apple IIe. See **operating system**.

ProDOS User's Disk: A set of programs for manipulating files created with ProDOS-based programs. See **utilities**.

ProFile: A mass storage device that can hold the equivalent of dozens of floppy disks.

program: (n.) Instructions that tell the computer what to do. (v.) To write instructions for the computer—to talk to the computer in terms it understands.

program disk: A disk containing an operating system and a self-starting program.

program manager: A program that lets you select application programs from a menu, once the applications are stored on a mass storage device like the ProFile, rather than swapping program disks and restarting the computer.

programmer: A person who writes computer programs.

prompt: A bracket (]) that appears on the screen when a program or programming language is waiting for you to supply information.

public domain software: Software that is free for the taking. You can get it at users group meetings or through computer bulletin boards.

pull-down menu: A menu that is hidden until you click on its title with the mouse.

radio-frequency (RF) modulator: A device that transforms your television set into a computer display device.

RAM: See **random-access memory**.

RAM card: A card that lets you expand the memory of your Apple IIe far beyond 128K to take advantage of more sophisticated application programs.

random-access memory (RAM): Temporary memory. RAM stores programs and data for the microprocessor.

read: To get information from a disk and put it in memory.

read-only memory (ROM): Permanent memory. Applesoft BASIC is stored in ROM.

read/write head: The mechanism inside the disk drive that gets information from disks and records information on disks.

remote computer: A computer that's across the room or across the country.

reserved words: Words or abbreviations that have special meaning in Applesoft BASIC programs and therefore can't be used as variables.

(RESET): A key that you can press in combination with (CONTROL) and (Ó) to restart a program.

resistor: An electrical circuit item on the main circuit board.

restart: Start the computer again. What you do when you press (Ó)-(CONTROL)-(RESET)

(RETURN): A key that you can press to move the cursor to the beginning of the next line. Also used in many programs to indicate that you've finished doing something and are ready to proceed.

RGB color monitor: An acronym for *red, green, blue*. A type of color monitor with unusually good resolution.

(→): A key you can press (in most programs) to move the cursor one character to the right.

ROM: See **read-only memory.**

run: Something programs do when the computer is carrying out their instructions.

save: To store a program or data on a disk (as opposed to storing it temporarily in the memory of the computer).

Scribe: Apple's thermal transfer printer.

scroll: (v.) To move all the text on the screen (usually upward) to make room for more text.

sector: When disks are formatted, they are divided into **tracks** and **sectors.** A sector is part of a track.

serial: Things occurring one after another—like soap operas. A serial interface means data is sent one bit at a time. Compare **parallel device.**

shielded cable: A cable that reduces the possibility of causing interference to radio, television, and other electronic devices.

(SHIFT): A key that you can press in combination with another key to get uppercase letters or the upper character on two-character keys.

simulation: A computerized representation of something in action.

65C02: The type of microprocessor (or brain) used in the Apple IIe.

slots: Long, narrow connectors inside the Apple IIe that let you connect printers and other devices to the computer.

software: Instructions that tell the computer what to do. They're usually stored on disks. Compare **hardware.**

software directory: A book that lists available software.

software pirate: A person who copies programs without the permission of the author.

(Apple): A key that programmers can use to control the way other keys in a program work. Compare (Apple)

source volume: The disk you're copying from. Compare **destination volume.**

(SPACE) **bar:** The bar at the bottom of the keyboard. Pressing it inserts a space character in your text.

spreadsheet: A type of application program that simplifies financial planning, cost estimating, and other number-crunching tasks. It is laid out in columns and rows.

start up: To load a program from a disk into the memory of the computer.

START13: A program on the *DOS 3.3 System Master* disk that makes it possible to run DOS 3.2-based programs.

startup disk: First disk used in a two-stage startup. Contains the operating system.

statement: A BASIC instruction.

stop bits: One or two bits that indicate the end of a character.

store: To file away for safekeeping. (Something you have to do with data you create using your computer. If you don't store your work on a disk, it will be lost forever when you turn off the computer.)

SuperPILOT: Apple's version of the PILOT programming language.

SYNTAX ERROR: An error message that usually occurs when you misspell a computer command. See Appendix B.

synthesizer: See **music synthesizer.**

SYSOP: Short for **system operator.**

system configuration: See **computer system.**

system operator: The human operator of a computerized bulletin board.

(TAB): A key that you can press in some programs to move the cursor forward a preset number of characters (usually eight).

template: A form, or electronic overlay, that allows non-accountant types to use spreadsheet programs.

thermal transfer printer: A quiet, inexpensive type of printer, like the Apple Scribe, that works essentially by burning characters on paper.

traces: Electrical roads that connect the components on a circuit board.

track: When disks are formatted, a series of concentric circles is magnetically drawn on the disk. Each of these circles is a track.

two-stage boot: See **two-stage startup.**

two-stage startup: A startup procedure that involves two disks.

type font: Size and style of typewritten characters (bold, italic, and so on).

(↑): A key that you can press, in some programs, to make the cursor move up one line.

users group: A computer club where members exchange information.

user ID: A number that identifies you as a subscriber to an information service.

user interface: The way a computer program communicates with you.

utilities: A set of programs that control and manipulate the information on disks.

variable: A letter or word that is a placeholder for information that will be supplied when the program is used.

vertical market software: Software designed for a particular audience.

video monitor: See **monitor.**

VisiCalc: The original electronic spreadsheet program for personal computers.

voice input device: A device that translates the spoken word into a form that some software can process.

volume: Another word for disk.

word processing: A type of application designed to make writing and editing easier and faster.

wraparound: The thing that happens in some programs when the cursor reaches the right margin—it jumps to the start of the next line without you pressing RETURN.

write: Record information on a disk.

write-enable notch: A small, square cutout in the upper-right corner of the disk that indicates whether or not information can be recorded on the disk.

write protect: To prevent accidental changes to the contents of a disk by covering the write-enable notch. Compare **copy protect.**

write-protect tab: A piece of tape that you can use to cover the write-enable notch on a disk so information can't be recorded on it.

Z80 card: A circuit board containing a Z80 microprocessor. An Apple IIe equipped with a Z80 card can run programs based on the popular CP/M operating system.

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Tell Apple About the Apple IIe

Your Name _____

Your Title _____

Company _____

Address _____

City/State/Zip _____

Work Phone _____

Home Phone _____

Apple uses comments and suggestions from Apple computer owners like you to improve existing products and develop new and better products. Now that you've used this product, we want to know your suggestions and thoughts about your experience. Please use this form to tell Apple what you think.

Your Dealer Can Help: Apple can't respond to your individual questions. If you have a question, would like help, or need service, please contact your Apple dealer.

Part 1: Tell Apple About You

1. How much prior experience have you had using computers?
   ☐ None ☐ Little ☐ Moderate ☐ Extensive
2. What computers have you used? _____
   _____
   _____
3. Where do you use your Apple computer? Check all that apply.
   ☐ Home ☐ Work ☐ School Other _____
4. How many people in your family/office use your Apple computer?
   Adults _____ Children _____

Part 2: Tell Apple About Your System

1. Which Apple computer are you using?
   ☐ Apple II Plus ☐ Apple IIe ☐ Apple IIc
2. How much memory does it have? ____ K
3. Date of purchase _____
4. Please list any devices attached to your computer; for example, Apple Joystick, Disk Drive II, Apple Modem, Imagewriter Printer. Please supply brand names.
   _____
   _____
5. Are you using a monitor or a television?
   ☐ Monitor ☐ Television
   What kind is it?
   ☐ Black and White ☐ Color ☐ Other
   Brand Name _____
6. Do you plan to write computer programs? ☐ Yes ☐ No
   If yes, which programming language(s) will you use?
   _____
   _____
7. What application programs do you use or plan to use with your Apple computer?
   ☐ Word Processing ☐ Data Management
   ☐ Spreadsheet ☐ Education
   ☐ Games ☐ Communication
   ☐ Graphics ☐ Other _____
8. Please list the products (program, operating system, or language) you use.

Name of Software	Version Number
_____	_____
_____	_____
_____	_____

9. Please give us any suggestions or comments and tell us about any problems you've had with your Apple computer. (Feel free to attach additional sheets.)
   _____
   _____
   _____

Part 3: Tell Apple About This Product

1. What did you like best about the manual?
   _____
   _____
2. What did you like least about the manual?
   _____
   _____
3. Which topics, if any, were confusing to you?
   _____
   _____
4. Did you read the manual from cover to cover?
   ☐ Yes ☐ No If no, which topics did you skip?
   _____
5. Did you try both sides of the training disk?
   ☐ Yes ☐ No If no, which side did you skip?
   _____

What did you like or dislike about the training disk?
_____
_____

6. Was the information presented appropriately for your level of computer expertise?
   ☐ Too Elementary ☐ Just Right ☐ Too Complex
7. Please describe specific problems you encountered in the manual. (Page numbers would be helpful. Feel free to attach additional sheets.)
   _____
   _____
   _____
8. Overall, how would you rate this product?

Low									High
1	2	3	4	5	6	7	8	9	10

_____

Thank you for your time and effort.

Apple Computer, Inc.

P.O. Box 1143
Cupertino, CA 95014

Tuck end flap
inside back cover
when using manual

Apple IIe Owner's Manual

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, California 95014
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